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# UTILIZATION OF WOOD WASTE IN KENTUCKY

# (House Resolution 163)

# TASK FORCE ON ENERGY

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Research Report No. 244

Legislative Research Commission Frankfort, Kentucky

This bulletin was prepared by the Legislative Research Commission and printed with state funds.

## **FOREWORD**

House Resolution 163, passed during the regular session of the 1988 General Assembly, directed that a study be conducted of the waste disposal problems plaguing much of Kentucky's forest products industry. During the 1988-89 interim, the Task Force on Energy examined the extent of the problem and identified steps the state could take to alleviate the problem. With the adoption of this report and its recommendations, the Task Force on Energy has completed its assignment.

The report was prepared by Mary Lynn Collins with the assistance of Linda Kubala, Charles Bush, and Diana Hill. Appreciation is extended to Steve Kayse, with the Forestry Division, for providing the results of the primary forest industry residue survey.

Vic Hellard, Jr. Director

The Capitol Frankfort, Kentucky November, 1989

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#### **GLOSSARY**

BIOMASS: Any organic matter, including forest residues, agricultural crops and wastes, wood and wood wastes, animal wastes, aquatic plants, and municipal wastes.

BTU: British thermal unit, the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

CO-FIRING: The simultaneous firing (combustion) of two different fuels in the same furnace or combustion chamber.

COGENERATION: The sequential generation of electric power (or mechanical energy) and process heat from the same fuel source.

**DENSIFIED WOOD-ENERGY PRODUCTS**: Fuel made by compressing wood residues to increase the density and to form the fuel into a specific shape, such as cubes, pressed logs, pellets, or briquettes.

DRY FUEL: Biomass materials with low moisture content, generally 8-10%.

ETHANOL: An alcohol produced by fermentation and distillation.

FEEDSTOCK: Any material which is converted to another form or product.

GASIFICATION: A chemical or heat process used to convert a feedstock to a gaseous form.

GREEN FUEL: Freshly harvested biomass not substantially dehydrated.

**HARDWOOD**: Trees that are usually broad-leaved and annually lose their leaves. Kentucky's commercial forests are made up primarily of hardwoods, such as oak, walnut, cherry, hickory, and yellow poplar.

KILOWATT HOUR (KWH): A unit of energy equivalent to the expenditure of one kilowatt for one hour, equal to about 3,412 BTUs.

LIFE-CYCLE COSTING CALCULATION: The total cost of an item over its lifetime, including initial purchase price, cost of operation and maintenance, and renovations.

**OIL OVERCHARGE MONIES**: A reference to money that Kentucky received as a result of various court settlements against oil and gas producers. In Kentucky these monies are deposited in the "Energy Assistance Trust Fund" and allocated pursuant to KRS 42.560 and 42.566.

PARTICULATES: Any finely divided solid or liquid material other than uncombined water. Particulate pollutants from wood and bark fuels include unburned carbon in the form of soot and inorganic materials that are carried into the combustion system along with the fuel, such as sand, clay, and dirt.

PAYBACK PERIOD: The term required to recover the purchase price of an investment (the initial cost) from net returns.

**PRIMARY FOREST PRODUCTS INDUSTRY**: The segment of the forest products industry which accomplishes the first stage of processing a wood product such as sawmills, chip mills, veneer mills, and pulp mills.

PURPA: Public Utility Regulatory Policies Act of 1978.

**SECONDARY FOREST PRODUCTS INDUSTRY**: The segment of the forest products industry which processes the wood into a finished or semi-finished product such as furniture, flooring, and mill work.

SOFTWOODS: Trees that have needles or scale-like leaves and are evergreens, for the most part, such as cedar and pine.

SOUTHEASTERN REGIONAL BIOMASS ENERGY PROGRAM: A federal regional program administered by the Tennessee Valley Authority. Grants are made annually by the program through the state Division of Energy for biomass demonstration projects or other promotional activities.

# UTILIZATION OF WOOD WASTE IN KENTUCKY

## **HOUSE RESOLUTION 163**

#### SUMMARY

# Chapter I—Introduction

Kentucky's forest products industry is facing a serious waste disposal problem which could hamper further expansion of the industry. Environmental regulations prohibit open burning of wood waste and restrict the burial of the waste to permitted landfills. Unable to find sufficient markets for waste byproducts, many in the industry have allowed their wood waste to pile up to critical levels. The Kentucky Forest Industries Association believes wood waste is a major problem, and, in some areas of the state, the biggest problem the industry now faces.

The forest products industry makes a vital economic contribution to the state's economy. Almost every county has some type of wood-industry-related activity. This industry has received much recent attention because of its potential to make a real contribution to Kentucky's rural economy.

As directed by House Resolution 163, the Task Force on Energy took up the wood waste disposal issue to determine how the amount of wood waste not currently being utilized could be reduced. At the same time the Economic Development Cabinet established, as directed in House Joint Resolution 122, a task force on the forest products industry. The focus of the Forest Products Industry Task Force is to develop a strategic plan to expand the secondary wood industry. This Task Force, early in the process, identified wood waste as a major barrier to such expansion.

# Chapter II—The Problem

Wood waste includes bark, slabs, edgings, chips, shavings, and sawdust. According to the mill residue survey of the primary forest product industries conducted by the Division of Forestry, Natural Resources and Environmental Protection Cabinet, Kentucky had 733,884 tons of mill residues last year with no market outlet. This was over 33% of all residue produced.

Almost all chips produced are sold for pulp and are not considered a problem. Bark waste does not appear to be a problem, since demand for its primary use as mulch is growing. The problem areas, according to the survey, are the solid pieces of wood and sawdust. It is presumed that most of the unutilized solid wood category is slab and edgings from small mills with no debarker or chipper. The only market for this material unchipped is firewood sales. One-half of the unutilized mill residues is sawdust and this is believed

to be the most critical problem area. In testimony before the Task Force on Energy, one sawmill owner indicated that he cannot expand his operation until outlets for his sawdust are found. The main buyer for sawdust is the pulp and paper industry. However, the sawdust is not used in the pulping process, but to fire boilers for process steam.

The mill residue survey showed the area of the state with the greatest amount of residue to be in Eastern Kentucky, in the Fifth and Seventh Congressional Districts. Lewis County, in the Seventh Congressional District, reported the largest amount of unutilized wood residue for any county, at 121,800 tons. Action to alleviate wood waste problems should be targeted first to these areas.

# Chapter III—State Initiative to Wood Waste Problems

In an effort to identify what steps states have taken to deal with wood waste disposal problems, a telephone survey was conducted of fourteen different states, including those surrounding Kentucky. Most of the states indicated that they too have difficulty getting rid of wood waste, especially sawdust. The states that have been most successful in utilizing wood waste reported a number of mill residue outlets: pulp and paper mills, particleboard manufacturers, and industrial wood energy systems. Several states reported the encouragement of more kiln drying of lumber at mill sites. There the wood waste can then be used to provide heat for the dry kilns. States also reported promoting the use of wood for energy purposes by funding wood energy systems in schools, hospitals, prisons, and state office buildings. Most of the demonstration projects states reported initiating to promote wood waste for energy purposes were funded with oil overcharge funds, monies all states received as the result of court settlements of oil price violations during the period of price controls, 1973-1981.

## Chapters IV and V—Uses for Sawdust

Because sawdust is believed to be the most critical problem, uses specifically for sawdust were further examined. Sawdust in the state is used in limited quantities locally for animal bedding and horticultural applications, and, in the western part of the state, to fuel fires for dark-fired tobacco. Most of the sawdust utilized in this state, however, goes to pulp and paper mills to be burned in wood-fired boilers. Sawdust-based products being produced commercially in the state include charcoal, sterilized laboratory animal bedding, and a meat smoker product. The most promising markets for increased use of sawdust appear to be: charcoal production, compost, particleboard, densified wood pellets and fuel logs, industrial wood energy systems, electric generation, and small specialty products like sterilized laboratory animal bedding.

Creating energy from sawdust can be cost competitive with other fuel sources in site-specific situations, if the sawdust is in close proximity to the energy production

site and the energy load is sufficiently high. The biggest barrier to wood energy systems is the high initial costs of equipment.

One energy application for sawdust which could, again in site-specific situations, be of benefit to the coal industry is the cofiring of wood and coal in order to reduce sulfur emissions. Cofiring of coal and wood is not a new technology but its use in sulfur emission reduction is relatively new. More research on the effects of cofiring the two fuels is needed. A feasibility study was recently completed on the modification of a coal-fired boiler to burn sawdust with coal on the campus of Morehead State University.

# Chapter VI-Resources and Options

A number of programs are in place which could be used in formulating strategy to reduce the amount of wood waste that goes unused in the state. That strategy should include efforts to encourage the use of wood waste both in manufacturing processes and in energy production. The Forestry Division and the Division of Conservation and Alternate Energy, both in the Department for Natural Resources, already have programs to encourage utilization of wood waste. Additional staffing, however, would be needed to increase these efforts.

There appears to be already in place sufficient monies targeted for economic development which could be used to attract large users of wood waste. These economic development programs include the Community Development Block Grant, the Kentucky Development Finance Authority, the Economic Development Bond Program, the Kentucky Infrastructure Authority, the Kentucky Rural Economic Development Authority, and the Commonwealth Venture Fund. However, guidelines for these programs, by stressing job creation, may prevent some small wood-using companies from receiving financial assistance—even though these companies, by using large amounts of wood waste, may indirectly create and retain jobs.

Less evident are incentives in place to overcome high initial costs of converting an energy system to burn wood waste. In order to increase the use of wood waste in industrial boilers, loan programs, tax incentives, or demonstrations in public buildings may be necessary.

# Chapter VII—Recommendations

The final recommendations adopted by the task force are as follows:

- 1. Any effort to address the wood waste problem should be done in conjunction with efforts underway to expand the secondary forest products industry. The state Economic Development Cabinet should use its economic development funds to encourage integrated wood industry operations where wood waste would be processed on the site or adjacent to the site where it is produced.
- 2. The state Economic Development Cabinet should seek a pulp and papermill, particleboard manufacturer, or other large user of wood waste to locate in Eastern Kentucky.
- 3. Those in the wood industry who will benefit from the creation of a new outlet for their wood waste should be encouraged to either share in the costs of any incentive package offered to land a user of wood waste or agree to make available at no charge their wood waste for a specified time period.
- 4. A demonstration project should be developed with economic development funds to establish an industrial park in which energy for occupants of the park comes from wood waste.
- 5. Guidelines for selection of projects to fund with state economic development monies should include consideration of environmental benefits and the indirect effects on job creation and retention.
- 6. The old sawdust piles have little energy value and need special attention. The University of Kentucky's Agricultural Cooperative Extension Service, in conjunction with the state Department of Agriculture, should embark on an educational campaign to encourage nurseries and farmers to utilize more sawdust in horticultural activities.
- 7. The state's universities should be encouraged to seek federal and private funding for research relating to wood waste products and wood waste energy production.
- 8. The state should use its funds from the Southeastern Regional Energy Biomass Program to fund a wood energy specialist position. The wood energy specialist could operate out of the Forestry Division, the Conservation and Alternate Energy Division, or under a shared arrangement between the two agencies. The wood energy specialist would continue the state's recent effort to document

- mill residues, identify companies for wood energy conversion, and provide market, financial, and technical assistance in using wood waste for energy purposes.
- 9. KRS 45.360 should be amended to require life cycle costing analyses of wood energy systems before conventional energy systems are installed or modified in state facilities. (KRS 45.360 already requires such consideration be given to coal systems.)
- 10. The state should proceed with the Morehead State University boiler retrofit to burn a blend of coal and sawdust for space heating purposes. A research and demonstration component, documenting the effects on emissions of cofiring wood and coal in various proportions, should be included in the retrofit project. Federal and private funding should be sought to assist in financing the project.
- 11. A corporate income tax credit based on equipment and installation costs should be offered to industries installing or modifying systems to burn either wood waste or a blend of wood waste and coal.
- 12. A revolving loan fund should be established to assist industries wanting to convert from oil and gas to wood waste energy systems.
- 13. Monies should be appropriated from the oil overcharge trust fund to provide:

  (a) funding for the Morehead State University boiler retrofit project (recommendation #10), and/or (b) grant monies for industries wanting to convert from oil and gas to wood waste energy systems.
- 14. The Conservation and Alternate Energy Division, with the assistance of the Finance and Administration Cabinet, should develop a plan to implement energy performance contracting in state facilities. This plan should include:

  (1) identification of any statutory changes needed in order for the state to participate in an energy performance contract, and (2) development of a model contract.
- 15. The Conservation and Alternate Energy Division should be encouraged to develop a wood waste energy program measure in either the state Energy Conservation Plan or the Energy Extension Service.
- 16. The \$10,000 remaining in the Alternate Energy Development Fund should be used for the promotion of wood waste energy. These funds could be used in conjunction with efforts suggested in the other recommendations.

## **CHAPTER I**

#### INTRODUCTION

Kentucky's sawmills are doing well. Lumber production in the state increased from 468 million board feet in 1974 to 812 million board feet in 1988. But the increased production has brought with it a waste disposal problem that threatens further expansion of the industry and could seriously hamper efforts underway to foster more instate processing of lumber products.

Byproducts of wood processing, particularly sawdust, have limited markets in many areas of the state. Environmental regulations have practically eliminated traditional methods of wood waste disposal: burning in the open air and landfilling. Unable to find sufficient markets for its waste and unable to dispose of the waste in an economical manner, many in the forest products industry have allowed their wood waste to pile up to critical levels. The Kentucky Forest Industry Association (KFIA) believes wood waste is a major problem, and, in some areas of the state, the biggest problem the industry now faces.<sup>2</sup>

# **Economic Values of the Industry**

The terms "primary" and "secondary" are often used to differentiate forest products industries. Primary refers to the first stage of processing generally accomplished at mills, such as sawmills, chip mills, veneer mills, and pulp mills. Secondary is used to refer to the further processing of the wood and results in a finished or semi-finished product, such as furniture, flooring, or millwork.

The primary and secondary sectors of the forest products industry make a vital economic contribution to the state's economy. The state Division of Forestry, in the Natural Resources and Environmental Protection Cabinet, estimates employment in the industry to include 23,000 people in over 1,000 manufacturing and individual processing operations. Annual sales for the industry are over \$889,237,000.3 Many believe, however, that the real value of this industry is in its potential to strengthen the state's rural economy, especially in light of national projections of increased demand for hardwoods.

Kentucky is a leading hardwood producing state, fourth in the nation.<sup>4</sup> But each year the state loses much of the value that could be added to the lumber product, since 75% of Kentucky's lumber is shipped out of state without further processing.<sup>5</sup> Consequently, the state's economy is unable to receive full benefits from this important natural resource.

Kentucky lost, at least partially as a result of the 1973-74 recession, 164 secondary manufacturers, many of which provided employment in rural areas.<sup>6</sup> The void left by this loss has not been filled.

The General Assembly formally recognized the opportunities for rural economic development through the forest products industry in 1986 by directing Morehead State University to develop a comprehensive plan to expand the state's secondary wood industry. The 1988 General Assembly insured continuation of this effort by directing the Economic Development Cabinet (House Joint Resolution 122) to set up a task force on the forest products industry. This task force, once established, identified wood waste disposal as a barrier for further expansion of the industry and assigned a subcommittee to the task of considering steps which could be taken to alleviate the problem.

# Activity of the Task Force on Energy

The 1988 House of Representatives expressed its concern on the wood waste issue by passing House Resolution 163, directing the Interim Joint Committee on Energy to study the problems associated with the disposal of the industry's wood waste. This report presents the findings of that committee, now called the Task Force on Energy.

The Task Force devoted three full meetings to the issue. The minutes from these meetings can be found in Appendix B. Tapes of these meetings are available from the LRC library, located on the fourth floor of the Capitol. The first meeting was held in October of 1988 in Morehead, an area of the state with a large concentration of sawmills. There the committee received testimony from Mr. Frank Crews, President of the Kentucky Forest Industries Association, and from two local sawmill owners, Mr. Jim Wells and Mr. Rick Armstrong. In addition, the Task Force heard from: (1) Mr. Steve Kayse, coordinator of the Forest Products Utilization Program, in the Division of Forestry, concerning the Division's efforts to establish a data base on the forest products industry; (2) Dr. Charles Nelson Grote, President of Morehead State University, on a feasibility study to retrofit one of the university's coal-fired boilers to burn a blend of coal and wood waste; and (3) Ms. Billie Clayton, Assistant Superintendent of Rowan County Schools, concerning the Rowan County High School's wood waste heating system. The Task Force also toured the school facility and the sawmill which supplies the sawdust to the Rowan County High School.

The second meeting on wood waste held by the Task Force on Energy was on February 28, 1989. Included on the agenda for this meeting were Mr. Phillip Badger and Mr. David Stephenson, with the Southeastern Regional Biomass Energy Program. They discussed the various energy alternatives using wood waste. The Task Force also heard from Dr. J. E. Jones and Mr. Dewayne Buckles, Mason and Hager Engineering Inc., relating to the study completed for Morehead State University on the feasibility of co-firing wood and coal in the university's boiler system.

The third meeting in which the Task Force on Energy took up the issue of wood waste was on May 23, 1989. At that meeting the Task Force was presented the findings of a survey on the amount and utilization of wood waste residues in the state and received recommendations by the Subcommittee on Environmental Regulations and Wood Waste.

of the Governor's Task Force on the Forest Products Industry. Also during this meeting, the Task Force reviewed a report on the issue drafted by its staff.

# Organization of the Report

Kentucky has taken the first important step in dealing with its wood waste problem by documenting the amounts of wood waste generated and not utilized by the primary wood industry. Chapter II describes the wood waste problem and discusses the results of the wood residue survey recently completed by the Natutal Resources and Environmental Protection Cabinet.

It was assumed that other states with a significant wood-using industry would also have experienced wood waste disposal problems. As part of the Task Force's work, therefore, a telephone survey was undertaken of those states surrounding Kentucky and of other key selected states, in an attempt to identify successful strategies to the problem that could be applied to Kentucky's situation. Chapter III describes other states' initiatives regarding wood waste.

Barring development of an inexpensive disposal method, solutions to the industry's problem are limited to the development of new products or expanded markets for products from wood waste. Since both the testimony presented to the Task Force and the results of the wood residue survey point to sawdust as the major wood waste problem, the main focus of Chapters IV and V is on increased markets for sawdust. These chapters deal with the various products produced from sawdust and the research currently being done in the search for new products. Chapter IV discusses non-energy uses for sawdust, such as horticultural, animal bedding and chemical applications. Energy-related uses are treated in a separate chapter, Chapter V, because this particular use currently appears to have the most potential to turn the waste product into a useful byproduct.

Chapter VI describes the various resources, programs and funding which are or could be made available to meet the challenge wood residues currently present to the industry. Chapter VII incorporates the conclusions and recommendations made by the Task Forceon Energy.

# 

## **CHAPTER II**

## THE PROBLEM

Wood waste, often referred to as wood residue, is the woody material left after each stage of processing, including bark, slabs, edgings, wood chips, shavings, and sawdust. Most residues in Kentucky are from hardwoods. In a typical sawmill operation an eight to twelve inch log will yield 40% lumber, 30% to 35% chips, and 15% to 25% other residues.<sup>7</sup>

# **Disposal Options**

Disposal of residues is accomplished in one of four ways: (1) incineration, (2) landfilling, (3) selling the material, or (4) using the material to generate energy at the plant site. The wood waste disposal alternative chosen by a particular operation depends on a number of factors, such as environmental regulations, costs of alternative fuels, market value and proximity to the market.

## Incineration

Prior to the passage of the federal Clean Air Act of 1970 and the subsequent adoption by the state of new air emission standards, many in the forest products industry burned their wood waste in what are called teepee burners. The teepee burners are incinerators for open air burning, which do not have dust controls or ash collectors. These burners were essentially grandfathered in under less restrictive emission standards than those adopted by the state for new incinerators. But even the lesser emission standards were difficult for the industry to meet. In addition, major modifications or repairs made on the burner place the incinerator under the stricter emission standard regulation for new incinerators. Consequently, most in the industry who were using teepee burners to dispose of their wood waste have dismantled the burners and are looking for alternative waste disposal methods. According to information provided by the Kentucky Division for Air Quality, only fourteen wood waste incinerators are currently permitted by the state, all of them being teepee burners.<sup>8</sup>

# Landfilling

Environmental regulations have also affected a second favored solution to wood waste disposal—the dumping or burial of it. State regulation 401 KAR 30.030 prohibits the burial or landfilling of any solid waste, including wood waste, without a permit. The permitting process is expensive, requiring soil testing and installation of pipes to collect water. But taking the waste to public landfills can also create significant costs for the industry. One sawmill owner, producing 40 tons of sawdust per day, estimated his annual bill to landfill, not including delivery costs, would be \$115,000.9 Average landfill costs are estimated to be \$4 per cubic yard. Under the new proposed landfill regulations, this cost could go to \$10 per cubic yard. Few, if any, in the industry are using permitted landfills for waste disposal. Some may, it is speculated, be dumping without the required permit.

## Selling the Waste

Market demand for wood waste varies according to the type of residue. The major market for wood chips is the pulp and paper industry. In some parts of the country wood chips are in such great demand that they are being produced from whole trees rather than as byproducts of wood operations. Increased demand for hardwood bark for horticultural purposes has opened up new market alternatives for this byproduct. Markets for slabs and edgings appear to be limited to firewood sales. Markets for sawdust in large quantities produced by the primary industries are particularly scarce. Again, the largest user of sawdust is the pulp and paper industry. The sawdust is not, however, used in the pulping process as are the wood chips. The sawdust is used to burn in boilers to produce process heat. As the amount of sawdust has increased, however, this particular use for sawdust has decreased, due to the industry's increasing energy efficiency.

As environmental regulations restricted landfill and open air burning as disposal options, the value of the markets and their proximity have, in some cases, become less crucial to the wood industry's decision to sell. Sawdust, in particular, is often being sold for hauling costs and in some cases at a loss. In testimony presented to the task force, one sawmill owner, for example, testified that he loses approximately \$23 for each trailer load of sawdust he delivers to a pulp and paper mill, but he has no cheaper alternative. A wood technologist for Morehead State University estimated the following losses for those sawmills in the Rowan County area choosing to truck their waste to the closest market outlet—125 miles away:<sup>11</sup>

**Assumed Costs** 

Trucking Cost: \$15/mile Tractor Trailer Load: 21 tons

Sawdust: \$6.50/ton

Trucking Cost: 250 miles x \$15/mile = \$375.00 21 Tons/Load: 21 tons x \$6.50/ton = \$136.50 Loss Per Load \$238.50 Loss Per Ton \$ 11.36

Large amounts of sawdust are made available at no charge to those willing to move the residue. And this approach can go a long way to alleviating the problem for smaller mills. Such arrangements are, however, often seasonal, erratic, and cannot be depended on for the disposal of large amounts of sawdust. The average sawmill in Kentucky produces 20 tons of sawdust daily.<sup>12</sup>

# **Producing Energy on Site**

In the last decade, the use of wood waste for energy by the forest products industry increased rapidly. On a national level from 1972 to the present the pulp and paper industry increased the use of wood to meet total energy needs from 41 to 57%. The solid wood products industry produces 73% of the energy it uses from wood. In Kentucky, too, use

of this disposal option increased. In a previous LRC report, completed in 1982, only 12 wood-using industries were identified as using wood energy. Today 34 wood-related companies, 14 in the primary and 20 in the secondary industry, are burning wood waste for process heat and space heating. Two of these companies are or have been producing electricity from their wood waste. The option of burning wood waste for energy as well as for disposal purposes is, however, limited by the size of the company, its energy needs and the amount of waste produced.

Stockpiling

Stockpiling could be considered a fifth, albeit, temporary solution for sawdust residue. Under 401 KAR 47:020 sawdust piles are considered automatically to be permitted by rule but must adhere to certain environmental standards, which can be difficult to meet. The sawdust on the pile must not blow, cause water or air pollution, or pose a fire hazard. Still, stockpiling is an option that has been used extensively by the industry in the past few years. Some who have used this option have run out of space and now face tremendous problems getting the old piles removed.

# Mill Residue Survey of Forest Products Industry

As part of a larger data collection effort on the part of the Kentucky Division of Forestry, both the primary and secondary industries were surveyed as to the amount of wood waste they generate but are unable to utilize. The purpose of this project was twofold: (1) to better document the wood waste disposal problem, in order to more effectively address the issue, and (2) to provide potential wood residue users with good market information as to the availability of residues. The survey results of only the primary industry were completed in time to be made available to the Task Force on Energy.

The types of industries included in the primary industry wood residue survey are: commercial and custom sawmills, veneer mills, pallet mills and mills that use logs or bolts in the production of staves, headings, furniture squares, or handle bolts. In order to come as close as possible to a 100 percent survey response rate, state foresters visited each of the industrial operations in the classifications previously cited and identified in the Forestry Division's directory, *Primary Wood Industries of Kentucky*, 1987.

# Residue Survey Results, Statewide

Table 1 presents the survey results on a statewide basis. The "residue unused" column represents that wood waste in each category which was not sold or used to burn on site for energy purposes. This category may include some small amounts of material which were given away, but the Forestry Division, in compiling the survey results, separated out of this column any residues specifically reported as having been given away. The 733,884 tons of mill residue reportedly not utilized is the industry's waste problem. This wood waste, if utilized, could be a useful byproduct, generating additional income for the industry. But, instead it is a liability.

For industry interested in utilizing wood waste, however, this 733,884 tons represent the minimum amount of wood biomass available. It does not include the previously existing quantities of surplus waste or the residues currently delivered at break-even prices or at a loss, sales of which would be quickly diverted if closer market outlets were available. Nor does the survey attempt to document logging residues, dead trees, or poor unmarketable timber, which could also be made available if a demand was there.

Table 1. Statewide Primary Industry Mill Residue Production, 1988

	Residue Produced (tons-initial condition)	Average Price Per Ton (delivered)	Residue Unused (tons-initial condition)	% of Residue Produced and not used
Chips	689,257	\$16.36	18,537	2.7
Bark	499,689	\$ 9.24	140,145	28.0
Sawdust	744,311	\$ 6.77	360,992	48.5
Solid Wood	275,517	\$ 8.95	202,730	73.6
TOTALS	2,220,254		733,884	33.1

Source: Data provided by Division of Forestry, Kentucky Natural Resources and Environ—mental Protection Cabinet

Profitable market outlets for chips are sufficient to utilize almost all chips generated. Most wood chips currently go to the state's two pulp and paper mills, located at Hawesville and Wickliffe, or to a pulp mill in Chillicothe, Ohio.

Bark is, in terms of weight, the smallest residue category. Bark's market outlet is for horticultural uses and for fuel. While 28% was not utilized, according to the survey, markets for hardwood bark mulch are expanding and this residue is not considered a problem.

Little of the solid wood residue is utilized, only 26%. Slabs and edging dominate this category and are probably generated by the smaller to medium-sized sawmills that do not have debarkers and chippers to further process the residue into chips for the pulp industry. Pulp and paper mills only use chips from debarked logs. Survey results do suggest a market opportunity for this particular residue if the product could be debarked and chipped. Current use for the solid wood—if it cannot be debarked and chipped—is for firewood on the local market.

In spite of the fact that the survey shows such limited markets for the solid wood category, both forestry and wood industry representatives agree that this category of surplus residue has not created the problems for the industry which sawdust has, perhaps, because the larger wood piles are easier to handle and less volatile. It is not clear from the survey how the industry is disposing of its solid wood residues. If, in fact, the industry is stockpiling the wood, this residue could create disposal problems for the industry in the future since the Division of Solid Waste plans to establish new reporting and environmental compliance standards for slab piles.

The real problem, according to testimony presented to the Task Force and borne out by the mill residue survey, is sawdust. Forty-nine percent of the sawdust reported produced in the survey was not utilized. As illustrated in Figure 1, sawdust accounted for 50% of all unutilized wood residue reported by the primary industry.

As was mentioned earlier, the main buyer of sawdust in this state is the pulp and paper industry. Other markets, such as those for animal bedding and mulch, are on a smaller scale and more localized.

Inability to rid itself of this sawdust may well be restricting further growth of the primary forest products industry. In testimony presented to the Task Force on Energy one sawmill owner explained that he could expand—and wants to expand his lumber operation—but cannot until outlets for the additional waste that would be generated from the expansion are found.

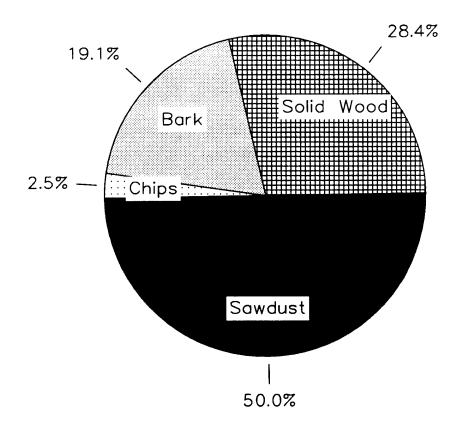
# Survey Results, Regional

One of the purposes of the Forestry Division survey was to document where in the state wood waste problems are most critical. Table 2 provides the survey results, according to congressional districts. The first, fifth, and seventh districts generate the largest amounts of mill residue. The First Congressional District, in western Kentucky, is able to utilize over 80% of its waste, presumably because of the two paper mills located in this district. The problem appears to lie in the fifth (southeast) and seventh (northeast) districts, where over 74% of the survey's total unutilized residues were reported. While the Fifth Congressional District, in southeast Kentucky, produces twice as much residue as the Seventh Congressional District, in the northwestern region, the districts have comparable amounts of unutilized residues. Any regional effort to address wood waste problems in the state should focus on these two districts. (Lewis County, in the Seventh Congressional District, reported the largest amount of unutilized wood residue for any county—121,800 tons.)

Figure 2 illustrates the quantities of wood residue, by county, that were unused and available in 1988.

Figure 1

# PERCENTAGE OF TOTAL PRIMARY INDUSTRY WOOD RESIDUE NOT UTILIZED - 1988



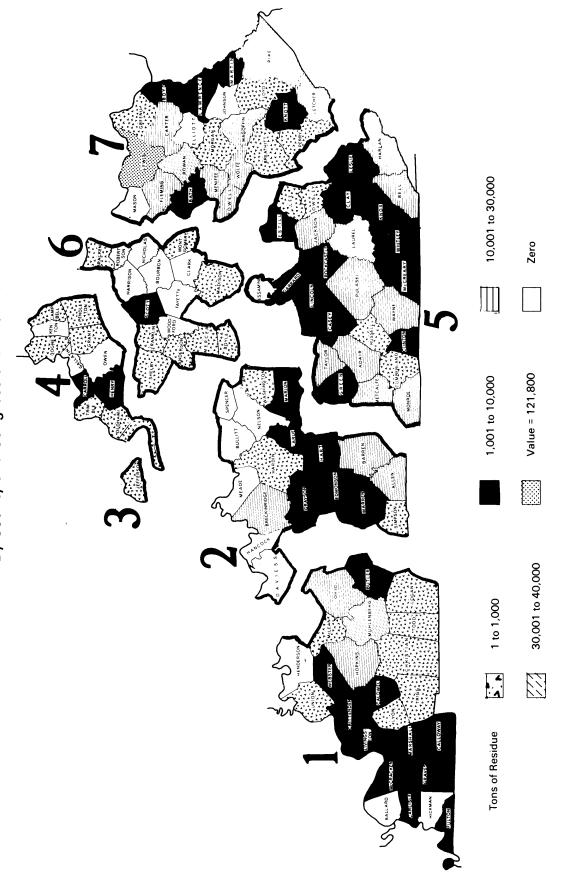
SOURCE: Forestry Division, KY Natural Resouces & Environmental Protection Cabinet

TABLE 2. Summary of Primary Industry Mill Residue Production, by Congressional District, 1988

Congressional District	Residue Produced (Tons-initial condition)	Total Residue Not Used (Tons-initial condition)	% of Total State Residue Unused
District 1	627,347	117,917	16.1
District 2	233,392	59,222	8.1
District 3	450	60	0.0
District 4	9,883	4,638	0.6
District 5	882,940	258,440	35.2
District 6	13,995	5,195	.7
District 7	452,247	288,412	38.3
Totals	2,208,774	722,404	100.0

Source: Data provided by Division of Forestry, Kentucky Natural Resources and Environmental Protection Cabinet

FIGURE 2 TOTAL PRIMARY INDUSTRY WOOD RESIDUE NOT UTILIZED, 1988 By County and Congressional District



Produced by the Information Resources - LRC

Source: Division of Forestry

Wood Residue of the Secondary Industry

The residues of secondary wood industries include sawdust, planer shavings, sander dust, and scrap from dried lumber. While these industries typically produce less residue than primary industries, they have fewer market outlets and face similar disposal problems. The Tennessee Valley Authority inventoried wood residues for the entire forest products industry within the Tennessee Valley Region in 1984 and found that two secondary industry groups, miscellaneous wood products and furniture and fixtures, accounted for over 26% of the unutilized wood residue produced in the region.

Large secondary forest products industries are apparently taking into consideration, as they make site location decisions, available markets for their residue byproducts. Both Forestry and Economic Development officials believe Kentucky lost a prospective major flooring industry last year to another state in part because the other state had more wood residue market outlets. That facility would have brought 700 new jobs into the state.

## Chapter III

## STATE INITIATIVES TO SOLVE WOOD WASTE PROBLEMS

In an effort to identify what steps other states have taken to deal with wood waste disposal problems, a telephone survey of fourteen states was conducted. In addition to the surrounding states, seven other selected states with significant wood-using industries were contacted. In most cases state contacts for the interviews were forest products utilization specialists located in state forestry offices. A listing of these contacts is in Appendix C. The purpose of the interviews was not to compare states in terms of amount of wood waste generated but rather to gain a general picture of how wood waste is being utilized in other states, what state initiatives have been taken to help alleviate wood waste problems and what initiatives have worked. However, five states and the Tennessee Valley Authority had recent data available indicating amounts of unused mill residue. This is summarized in Table 3. Table 3 indicates that Kentucky's problem, while more serious than some, is not isolated. In terms of percentage unused, only Georgia and Virginia come close to utilizing all of their mill residues.

TABLE 3. Summary of Mill Residue Production in Selected States and the Tennessee Valley Region

State	Year Surveyed	Produced (tons-initial condition)	Unused (tons-initial condition)	Rate Not Used (Percentage)
Arkansas	1983	3,525,732	476,202	13.5
*Georgia	1986	2,203,762	39,194	1.8
Kentucky	1988	2,220,254	733,884	33.1
Missouri	1988	1,558,561	836,340	53.7
Virginia	1986	5,343,400	456,953	8.5
W. Virginia	1986	1,415,632	281,218	19.9
**2 Tenn. Valley Region	1984	8,700,382	1,115,892	12.8

<sup>\*1</sup> Hardwoods only are included. On a percentage basis Georgia is able to utilize even more of its softwood residue.

The following is a summary of the state interviews, supplemented by any additional information sent by the state forester subsequent to the interview.

<sup>\*\*2</sup> Includes all of Tennessee, parts of Ky., Va., N.C., Ga., Ala., and Ms.

## **Surrounding States**

## Illinois

Illinois is one of the few states surveyed that reported wood waste not to be a problem, in part because the state does not generate a lot of mill residues, only 417,000 tons of sawdust per year (compared to 744,000 tons for Kentucky). The biggest use of sawdust currently in Illinois is for livestock bedding for agricultural and horse industries. Two state initiatives regarding wood waste were cited. The state's forestry school is using old sawdust from a mill that has gone out of business for experiments on sawdust as a growing medium. The potting soil they have produced from the source is 90% sawdust and has been found suitable for most growing applications. The secondary activity mentioned was the awarding by the state's energy office of a \$250,000 grant for assistance in the construction of an integrated wood waste-to-energy system for electric generators at the state's largest sawmill. This award was made, not because wood waste is viewed as a problem in Illinois, but because increased use of wood waste could make the residues a more profitable byproduct. Funding for the grant comes from a state bond issuance program for coal and alternate energy projects.

#### Indiana

Indiana reported that wood waste is just emerging as a problem and will become more acute because of new water quality concerns. The state has not made an attempt to document the problem in recent years and has not taken any actions to reduce the necessity for wood waste disposal. The largest user of wood waste here is the industry itself, which uses the waste for energy production.

#### Missouri

According to Table 3, Missouri faces an even larger wood residue problem than Kentucky, which would account for the variety of actions taken to reduce the amounts of unutilized wood residues. In 1986, Missouri considered two pieces of legislation designed to reduce unutilized wood residues. The first measure, which was adopted, provides a tax credit for companies that take wood waste and alter it, either mechanically or chemically, for use as an energy source. The bill was aimed at the wood pellet industry but could be used for other products. To date only two companies have applied for the tax credit, but another one is expected to apply soon. The second bill considered would have set up a revolving loan fund for public schools, to help finance qualifying wood heating systems with a projected payback of five years or less. This legislation did not pass. Several rural public schools in Missouri already burn wood waste for space heating, as does one state university. Another state university retrofitted a coal boiler to burn a blend of coal and wood. The blending of coal and wood reduced sulfur emissions and enabled the university to start burning local high sulfur coal.

The latest effort by Missouri was to fund what was for the present survey the most extensive documentation found on the amount and condition of wood waste. Included in its study is an inventory of old sawdust piles and an inventory of current users of wood

waste for fuel. The study was funded through oil overcharge funds, which are monies all states have received in various amounts as the result of court settlements of alleged price violations on petroleum products during the period of price controls under the Carter Administration. Missouri is also considering using oil overcharge funds to develop a market for wood pellets.

One noteworthy venture that was initiated by the Missouri Forest Products Association several years ago was the formation of a marketing group to promote the use of wood residues and to act as a broker. The marketing group was instrumental in encouraging the burning of wood in state institutions and in a major army base where wood chips are mixed with solid waste in a boiler to aid combustion. The effort was successful in establishing standardized market values for wood residues. Through the marketing entity, small producers were able to participate in bids for large wood residue contracts, which they never could have accomplished on their own. The marketing group disbanded because of internal problems, but both the Missouri forestry official and the industry association official recommended the concept to other states wanting to create more market outlets for their wood waste.

## Ohio

Wood waste is viewed as a serious disposal problem in Ohio. Teepee burners have been dismantled, markets are not sufficient to take up the slack and the wood waste is accumulating on site. Sawdust was reported as a particular problem, with an estimated rate of utilization of no more than 25%. Forestry officials are currently documenting the problem and plan to go before their legislature to ask for assistance. The biggest market in Ohio for wood waste is for energy. The Meade Paper Company uses sawdust to burn in its boilers to create both steam and electricity in a cogenerator arrangement. The electricity is then sold to a municipal utility.

The Ohio forestry official interviewed suggested two areas for alternative or expanded use of wood waste: (1) producing chemicals from wood waste, which is the object of much current research and, (2) establishment of small cogeneration facilities to produce steam for process heat and to run a turbine to generate electricity for hospitals and schools.

#### **Tennessee**

Tennessee's wood waste problems have been greatly reduced in the last ten years. At one time 75% of Tennessee's wood waste was not being used. Today forestry officials estimate that at least 80% is being utilized. No state action was cited for the increased wood waste market outlet. A likely explanation is recent expansion of some of the local pulp and paper mills which use sawdust to produce process heat. Tennessee has five pulp mills and market access to two in Kentucky and one in Alabama. In addition, a number of wood-fired dry kilns have also been installed in some of the state's smaller sawmills, enabling the mills to utilize more of the waste on site.

# West Virginia

West Virginia University has been an active participant in the search by that state for ways to alleviate the forest product industry's wood waste disposal problems. A wood residue survey of the industry was recently completed by the University's Agricultural and Forestry Experimental Station. The University also prepared a marketing study which identified wood densification plants as economically justified investments. The state is now actively seeking companies to manufacture densified firewood logs.

The state has also used money from a federal grant program, the State Energy Conservation Plan, to set up two dry kilns fueled with wood waste. A smaller project targeted for wood waste utilization is increased use by the state Highway Department of sawdust in combination with salt and ashes for wintertime treatment on icy roads.

# Virginia

Wood waste is not a problem in Virginia except in a few isolated cases. The 1986 survey reported a 91% utilization rate and forestry officials expect the next survey to show even greater utilization. There are two reasons for this high utilization rate: the large number of manufacturing concerns which use wood waste to produce products; and the industrial use of wood energy. Virginia has 12 particleboard plants, seven pulp mills and two hardboard plants. Several non-forest-products industry facilities which previously used exclusively coal for space heating are now burning a blend of wood and coal in order to meet sulphur emission standards. Virginia Power Company recently decided to put out bids for new energy rather than build a new power plant. One of the eleven project winning contracts to supply the utility's energy needs was a 76-megawatt unit using wood, wood waste, and coal. Virginia also has three state facilities that were retrofitted to burn wood waste for space heating purposes. Sawdust has been utilized so successfully that two plants are not using wood waste but are instead using chips manufactured from entire logs.

## **Other Selected States**

#### Arkansas

In Arkansas a consortium of state universities has mapped out an aggressive rural economic development plan based on surplus mill and logging residues. The plan calls for developing 12 industrial parks to be called "energy parks," to lure energy-intensive industries to the park by offering cheap electric rates. The energy parks would use cogenerated steam and electricity created from wood residues. The industrial parks already exist but are largely unoccupied. The consortium is requesting \$1.3 million in oil overcharge monies from the state in order to implement the plan. In addition to this effort, which at this date has not been acted upon, an electric company in Arkansas is evaluating available wood residues as an energy source which that company could look to in the future.

# Georgia

With less than one percent of wood waste unutilized, Georgia has no wood waste problem. Again, the two factors which appear to explain the lack of wood waste disposal problems are the presence of large industrial wood waste users and a thriving wood energy business. Georgia has 15 pulp and paper mills and at least four particleboard manufacturers. In 1979, the Georgia Forestry Commission established the Wood Energy Program to promote forest resources as an energy resource. Program funds were used to publicize the use of wood energy, provide technical assistance to industry interested in converting to wood energy, and to finance the construction and upgrading of wood energy systems at public schools and state facilities. As a result of this program Georgia has five public schools, two hospitals, and three prisons with wood-fired heating systems. In addition, the Forestry Commission's own office building is heated with wood. A number of Georgia industries, some of which are not forest industry related, are also using wood residues for space heat and process steam. The Wood Energy Program has been reduced in size but the state continues to use its funds from the federally funded Southeastern Regional Biomass Energy Program to maintain a wood energy coordinator position.

An effort is underway in the state to encourage sawmills to band together as a cooperative to establish dry kilns, in order to dry lumber products before shipping. This is an effort to gain more "value added" to the product before it leaves the state. A side benefit to such an arrangement for a state with wood residue problems, however, would be the opportunity to use the waste products of the participating sawmills in kiln heating systems.

#### Idaho

Much of Idaho's mill residues end up in a specialty pulp mill which produces liner board for milk cartons. This particular pulping process incorporates sawdust with wood chips at about a 50/50 ratio. In addition sawdust is used to fuel plant boilers. In order to further increase mill residue utilization, Idaho is concentrating on the promotion of wood pellet manufacturing. The market for wood pellets, another wood densification product, centers on residential heating use, but some schools in this state are also using wood pellets. As part of a \$174,000 project funded with oil overcharge monies, wood pellet stoves are being placed in low-income households in ten counties to demonstrate the benefits of burning wood pellets.

# Michigan

In spite of the fact that Michigan has a number of wood energy projects in the industrial, commercial, and public sectors, sawdust is being landfilled in certain areas of the state. The state set aside \$300,000 of its oil overcharge monies for wood energy demonstration projects and is now soliciting proposals for funding. The Public Service Commission of Michigan is currently reviewing the state's future energy needs, in an effort to determine how energy demand should be met. In this effort representatives of 30 different non-utility wood energy projects have expressed interest in obtaining a power contract. Michigan also reported the promotion of integration of forest products industry facilities—placing operations producing large amounts of residue adjacent to operations using the residues.

#### North Carolina

Wood waste was a problem for North Carolina 12 years ago. The state put together an active program promoting sawdust and other mill residues for industrial fuel. Tax incentives were passed by the state legislature for the use of alternative fuels, including wood. Today forestry officials estimate that no more than six percent of the state's mill residues go unused .

The biggest consumer for sawdust in the state is the brick industry, which uses ground sawdust to bake the bricks. Particleboard manufacturers use sawdust both in their manufacturing process and to fuel boilers. Several textile firms use wood waste to produce process steam. Two prison units and a school use wood for space heating. Several cogeneration facilities in the state are using wood waste and there is interest in establishing more such facilities.

The legislature has not funded the residential alternate energy tax incentive since 1986. However, North Carolina continues to offer a 15% corporate income tax credit for costs associated with converting to wood-fired systems. The forestry department's current emphasis regarding mill residues is on the encouragement of more integration of wood using industries. For example, a firm to produce both veneer and plywood was recruited to locate next to a particleboard plant. The veneer waste goes to the plywood plant. Any waste from the manufacturing of the plywood then goes to the particleboard plant. Thus, all mill residues are used more efficiently without a great deal of handling and transportation costs.

## Pennsylvania

Some in Pennsylvania's wood industry are paying public landfills as much as \$60 a ton to dispose of their sawdust. Outside the forest products industry itself, there has been little industrial use of wood energy. Only one state institution, a hospital, uses wood energy. In an effort to solve its wood waste problem, Pennsylvania has chosen to use its federal biomass money, which all states receive, to fund the position of a biomass energy forester. The forester works jointly for the Forestry Bureau and the Pennsylvania Energy Office. This sharing arrangement provides for maximum coordination between the two programs. Currently, Pennsylvania's focus is on (1) wood energy conversion of the greenhouse industry, and (2) six possible projects in state facilities demonstrating the environmental benefits of burning a blend of coal and wood.

#### Wisconsin

The most common use for sawdust in Wisconsin is for animal bedding. Most of the wood energy systems in the state are associated with the wood industry. Approximately twelve businesses not related to the forest products industry have opted to use wood waste to generate energy for their operations. Wisconsin's biomass energy program provides free economic analyses to industries, businesses, and institutions interested in installing a wood energy system. Program focus is at the commercial and industrial level. Wisconsin is using a portion of its oil overcharge monies to provide grants to wood products firms to enable them to utilize their own waste for energy.

### **CHAPTER IV**

#### NON-ENERGY USES FOR SAWDUST

Since the most pressing disposal problem appears to be sawdust, the specific product uses for sawdust were examined. This chapter considers outlets for sawdust which are not energy-related. Most of the sawdust produced in the state is from hardwoods, particularly oak and yellow poplar. Most of the sawdust from the primary industry is green; much of the sawdust from the secondary industry is dry. For those uses of sawdust where wood chips can be substituted, chips are preferred. In those cases, cost and availability are the only factors favoring the use of sawdust. Sawdust is absorbent, abrasive, bulky, fibrous, nonconductive, and granular. It is these qualities which determine the way the residues can be utilized.

Despite years of research, efforts to develop new profitable outlets for sawdust have met with little success. One of the more interesting efforts by the United States Forest Products Laboratory to produce products from wood residues was research conducted incorporating sawdust into cattle feed as roughage. The laboratory used both aspen and oak sawdust and found both to be usable roughage material in concentrations of 5% to 15% of the feed. The U.S. Department of Agriculture approved aspen as animal feedstuff, but it is only used on a very limited basis in Wisconsin and Minnesota. Procedures to request USDA approval for oak sawdust have never, according to the United States Forest Products Laboratory, been initiated. 18

# Current Uses of Sawdust in the State

Sawdust in small quantities is locally used by the agricultural community and by local nurseries, primarily because of its low cost. In most cases, the sawdust is given away or sold at a price to cover transportation costs. In addition, sawdust is processed as sterilized animal bedding and as a meat smoker product for wholesale markets. These uses account for a very small fraction of the sawdust produced.

## Horticultural Use

Sawdust can be incorporated into the soil as a soil additive. Although the wood itself contains no appreciable fertilizer chemicals, the sawdust acts as a conditioner, improving soil tilth and increasing the permeability and water retention of the soil. Well rotted sawdust can be applied directly to the soil. Fresh sawdust, as it breaks down, ties up the soil's nitrogen. Therefore, it is necessary to add additional nitrogen when fresh sawdust is worked into the soil.

Sawdust can also be used as a mulch applied above ground to conserve moisture, to maintain temperature, and prevent weeds. Nurseries use sawdust both around their seedlings and to heel in plants. Ideally, sawdust should not be used as a mulch until aged at least 6 months. But during last summer's drought even green sawdust was used by

local nurseries to conserve moisture. A professor with the University of Kentucky's Agricultural Extension Service indicated in an interview conducted for this report that the use of sawdust in nurseries and farms for horticultural purposes could possibly be increased.

The Weyerhaeuser Company has conducted research experiments on the composting of wood waste and concluded that such wastes are compostable if manure is added to the product. Some local sawmill owners, with large amounts of sawdust, are showing interest in integrating a bagged compost product into their company operations. No commercial compost product is currently being produced, however.

# **Animal Bedding**

Sawdust is used in small quantities by local farmers, primarily as bedding for horses. However, the sawdust is not as widely used as it could be because the dust can irritate an animal's respiratory system. Seaboard Farms of Kentucky Inc., a large chicken operation planned for Mayfield, expects to purchase large quantities of wood shavings and possibly some sawdust for the operation. A commercial animal bedding product is discussed below.

# **Specialty Wood Waste Products**

Sawdust is considered too fine for use in commercial pet litter. But a company established in Columbia, Kentucky, two years ago is buying up sawdust within a 100-mile radius to produce a sterilized animal bedding product for laboratory animals. The sawdust required for this product is restricted to certain species, such as poplar, birch, and maple. Oak sawdust, because of the tannic acid it contains, is unsuitable for this product.

This company also produces from hickory and maple sawdust a meat smoker product which is sold to large wholesale meat companies. The company produces in all 14 different products from sawdust and other wood residues, and uses, on the average, 350 tons of sawdust weekly.<sup>20</sup> This company is able to produce profitable products from a material that is piling up unused at many of the mills elsewhere in the state. There appear to be opportunities for expansion for this company and other speciality wood product companies.

### Other Possible Uses for Sawdust in the State

An effort was made to identify products, which could be produced in Kentucky that require large amounts of sawdust. The products thus identified are a mixture of new and old technologies.

#### Particleboard

Of all the composite wood panel boards produced, particleboard is the only product which uses much hardwood sawdust in the production process. Particleboard uses planer shavings, supplemented by sawdust. The particleboard industry was identified in a market study of the state's wood products industry currently completed by Morehead State University as a key growth industry. This study recommended expansion of reconstituted wood products industries in order to alleviate wood waste disposal problems. According to the U.S. Industrial Outlook, shipments of particleboard are expected to grow 5% annually. Like a paper or pulp mill, a particleboard plant requires high capital investment. However, particleboard plants do not need the quantities of water required at pulp and paper mills.

#### Chemicals

While a number of chemicals are derived from wood, most use pulp residues as their feedstock. One chemical which could be developed directly from sawdust, however, shows particular promise. Carbon black, a product similar to charcoal, is a pure carbon product which is produced when materials containing carbon are burned without enough oxygen for them to burn completely. Carbon black, also called lamp black, has wide industrial applications. The material is used in tires, cosmetics, and in various printing products. A company in Missouri is currently installing the first manufacturing plant in the United States using a patented process developed in South Africa to make carbon black with hardwood sawdust and wood chips.

Research currently underway at the Solar Energy Research Institute (SERI) could in the future go far in utilizing sawdust in this and other states. SERI is working through a consortium, made up of industrial members like General Motors, to convert sawdust and pulp mill residues into an adhesive which could substitute for formaldehyde at one half the cost.

## Stabilization and Disposal of Municipal Waste Water Sludge

Composting, although not a new way to dispose of sludge, has received new attention as the process has been refined. Typically, in the composting of sludge, wood residues are added to the sludge to provide carbon and bulk to the mixture. The composting process is then speeded up by providing oxygen-rich, aerobic conditions. The sludge is composted, or "cured," within two weeks to a month and a humus material is produced that can be marketed as a soil amendment. Over 147 cities have planned or put in operation composting facilities.<sup>23</sup> Different methods of stabilizing the sludge by composting are being used. In Nashville, Tennessee, for example, wood chips are being used in what is called the static pile process. This method involves the laying of sludge and chips in piles outdoors. Once the sludge is composted, the chips are screened and a portion is recycled. A Kentucky sawmill has the contract to supply the wood chips to the city of Nashville. The city of Hamilton, Ohio, is using a process called in-vessel composting, where sawdust is added to the sludge and the mixture placed in huge tanks to "cure".

Even with a marketable byproduct, composting is considered an expensive method of disposing of municipal sludge. In addition, some cities have had problems with high lead content in the composted product. If, however, these problems can be overcome, composting sludge could become an important market outlet for wood residues, especially sawdust.

#### CHAPTER V

#### ENERGY FROM SAWDUST

Few products were identified in Chapter IV that use substantial quantities of sawdust. But the material has a number of energy applications. Currently, the major use for sawdust in this state is as fuel and this use appears to be the most promising for expanded use if Kentucky is to follow national trends. In the United States the pulp and paper industry is the largest user of wood energy, the lumber industry is the second largest user, but the fastest growing sector to use wood energy is the non-forest-products industries. Large industrial companies like Dow Corning and Procter and Gamble are now using wood energy; both utilities and independent non-utility power producers are now generating electricity from wood. A study by the Thayer School of Engineering at Dartmouth College predicts that by the year 2000, nearly 20% of all industrial boilers in the South will be wood-fired. 25

The purpose of this chapter is to focus on energy applications which could or do use sawdust. At those times when it is difficult to isolate sawdust from other wood energy resources, the more general term wood energy will be used. It should be noted that the state has a much larger wood resource base to draw on for energy production than just mill residues. According to the state Division of Forestry, Kentucky has available, on an annual basis, 7,570,740 dry tons of woody biomass from logging residues, timber, and rough trees having no lumber value.<sup>26</sup>

The one agricultural application using sizeable amounts of sawdust over a brief period of six to eight weeks each year is the fueling of fires for dark-fired tobacco in Western Kentucky. The reduction in the tobacco bases has reduced sawdust consumption for this purpose.

Thirty-four Kentucky forest products companies hold permits to operate wood-fired boilers.<sup>27</sup> Most of these companies are firing their boilers with wood waste in order to produce steam for process use and to heat drying kilns. Some are also using the produced heat to warm plant facilities during cold weather. One company currently produces electricity, and another company did until recently. In addition to the thirty-four companies with wood-fired boilers, a public school and a distillery are also firing boilers with wood waste.

#### **Economics of Wood Fuel**

As with all alternative fuels, utilization is driven primarily by costs of conventional fuels. Wood waste, if available locally, can in many cases compete with conventional fuels, as shown by the fuel cost comparison developed for the state of Missouri in Table 4. For comparison purposes the average price for sawdust in the survey discussed in Chapter II was \$6.77 a ton.

TABLE 4

Fuel Cost Comparison
(Per Million BTU of Useable Heat)

Fuel	Price/ Gal.	Cost/ Million BTU	Fuel	Price	Cost/ Million BTU
T uci	Gui.	Million DI C	1 uci	TTICC	<u> </u>
Fuel Oil	.60	5.44		Per KWH	
(138,000 BTU/gal	.70	6.35	Electricity	.04	12.33
80% Efficiency	.80	7.25	(3415 BTU/KWH)	.05	15.41
	.90	8.16	95% Efficiency	.07	21.58
	1.00	9.07	-	.08	24.66
Natural Gas (10° BTU/MCF) 80% Efficiency	Per MCF 2.00 3.00 4.00 5.00 6.00	2.50 3.75 5.00 6.25 7.50	Oak Sawdust (4700 BTU/lb) 45% Moisture 65% Efficiency	Per Ton 3.00 4.00 6.00 8.00 10.00	0.49 0.66 0.98 1.31 1.64
	Per MCF			Per Ton	
Eastern Coal	30.00	1.45	Wood Chips	18.00	
(13250 BTU/lb) 75% Efficiency	$40.00 \\ 50.00$	$\begin{array}{c} 1.94 \\ 2.42 \end{array}$	(4700 BTU/lb 45% Moisture	$20.00 \\ 22.00$	$3.27 \\ 3.60$
10/0 Difficiency	60.00	2.91	65% Efficiency	25.00	4.09
	70.00	3.39	00% Littlefield	30.00	4.90
	10.00	0.00		90.00	4.00

Source: Missouri Forest Products Association

The low fuel price for wood is offset by higher capital investment, and higher operating and maintenance costs than those for gas or oil-fired systems. The capital cost of a wood energy system ranges from two and one-half to seven times that of a comparative gas or oil-fired energy system.<sup>28</sup> The capital equipment costs for wood-fired boilers and coal-fired boilers are comparable.<sup>29</sup> While the fuel handling equipment for wood is more expensive, since more space is required, coal systems require more expensive air pollution and ash handling equipment.

The system costs for a wood energy system decrease as plant size increases, because economies of scale reduce unit costs. Whether wood-fired systems are a good investment for a company or an institution is very site-specific, the most important factors being

close proximity to a low-cost fuel source and heating demands of sufficient size. The Tennessee Valley Authority has prepared an economic analysis on 57 different wood energy systems, some of them not wood-industry-related, and has found wood energy, in most cases, to be cost effective.<sup>30</sup>

The biggest barrier to wood energy systems is the capital investment. Mr. A. B. Curtis, a forest products specialist for the U. S. Forest Service, made available to state forestry offices a computer program several years ago which can be used to prepare a preliminary economic analysis for companies interested in converting to wood energy. He reported that in a number of cases in which the completed analysis indicated a wood system economically feasible, the company did not carry through the conversion because of high upfront costs.<sup>31</sup> In two different studies reported in the *Forest Products Journal*, one surveying non-forest-products wood energy users and one surveying fossil-fuel-using industries, the biggest constraint identified by both groups to using wood energy was the high capital costs associated with wood system installations.<sup>32</sup>

# **Environmental Factors of Burning Wood**

Wood is a relatively clean-burning fuel, containing no sulfur and little ash. A big advantage wood has over fossil fuels is lower nitrogen oxides emissions. The major environmental problem associated with wood-fired installations is particulate emissions. Particulates can react with water vapor to form smoke, reducing visibility, and can be a health hazard. Particulates, however, can be controlled with readily available mechanical technology. Kentucky, like all other states, regulates particulate emissions from industrial boilers.

# Co-firing Wood With Coal

An area of particular interest to the Task Force was the potential for environmental benefits of simultaneously burning coal and wood in the same combustion chamber. Cofiring wood with coal is not a new technology. The pulp and paper industry has been co-firing for years. However, using the technology to reduce sulfur emissions is a relatively new concept. Several studies that have been done suggest that the burning of wood with coal results in a greater reduction of sulfur emissions than a simple dilution effect would account for.<sup>33</sup> Apparently, because the flame height of wood is higher than the coal flame, some of the coal's sulfur is absorbed or more thoroughly combusted in the wood flame. One study conducted by Southern Illinois University concluded that co-firing wood with high-sulfur coal, in selected proportions, may be a viable substitute in some cases for expensive scrubbing equipment.<sup>34</sup>

When the University of Missouri at Rolla decided to replace its coal-fired boilers with a new unit, the University took advantage of studies conducted by their Engineering Research Laboratory on wood and coal co-firing. The University installed a new system equipped to burn a blend of the two fuels. The new system came on line in 1984 and

has, by burning 25% wood, displaced the low sulfur out-of-state coal they had been burning with Missouri coal containing three to four percent sulfur. Coal costs per ton were reduced from \$52 to \$35. The University predicted a 2.7 year payback on the system, based on fuel cost savings.<sup>35</sup>

Other benefits from co-firing wood and coal include: (1) reduced particulate emissions; (2) decrease in slagging of firewalls and decrease in ash bed clinkering; and (3) long-term decrease in equipment corrosion, due to overall lower ash content.

The Southeastern Regional Energy Biomass Program funded a study for Morehead State University on the feasibility of burning either sawdust or sawdust and coal in the campus boilers. The study recommended conversion of one of the university's boilers to burn sawdust in conjunction with coal. Costs to implement this recommendation were placed at \$821,900, with an estimated payback period of 10.7 years.<sup>36</sup> Consultants from Mason and Hanger Engineering Company, who were responsible for the feasibility study, appeared before the Task Force on Energy and acknowledged the life cycle costing calculations of savings on the project prepared by Mr. C. J. Lohr, then Program Coordinator for the Forest Products Utilization Program in the Division of Forestry. Mr. Lohr's calculations, based on the Mason and Hanger study and a twenty-year life cycle of a heating system, indicated savings to the state over the lifetime of the facility of \$2.3 million to \$3.7 million, depending on the option implemented.<sup>37</sup>

In the course of the present study, the Task Force received a recommendation from the manager of the Southeastern Regional Biomass Program, Mr. Phil Badger, that more research needed to be done to further document the sulphur emission reduction of co-fired systems. If funding could be found, the Morehead State University retrofit project could possibly be worked into such a research effort.

There has also been some utility interest in the state in co-firing wood and coal. One state utility, Kentucky Power Company, considered the possibilities of using sawdust as 5% of their total heat input in one of their pulverized coal boilers. Physical space limitations and costs associated with providing a separate fueling system, however, make co-firing wood and coal unlikely for this particular utility.

Until recently, wood could not be pulverized like coal is in today's modern coal plants. Weyerhaeuser has developed more cost-effective technology to pulverize and burn wood. A Missouri-based company was producing a pulverized wood product in Kentucky but discontinued production for economic reasons. The product could not be produced cheaply enough to compete with oil and gas. If the production costs of pulverized wood go down as conventional fuel prices go up, pulverized wood may be particularly attractive for co-firing with coal in utility settings.

# Co-firing Wood With Municipal Solid Waste

Another application of sawdust for electric generation which may be useful to Kentucky communities in the future is burning sawdust in waste-to-energy facilities. The wood material acts as a combustion agent and promotes more complete burning of the solid waste. In addition, sawdust can be used in such facilities as a supplement to level out fuel needs for those periods when the amount of available refuse is not sufficient to meet energy demands. Waste-to-energy systems can even be purposely overdesigned in anticipation of future refuse stream growth by initially burning sawdust with municipal waste and gradually decreasing the use of sawdust as the amount of available municipal waste increases. At this time, however, no municipal solid waste-to-energy facilities are operating in the state.

# **Electric Generation: Small Power Production**

Production of electricity from wood and wood waste is growing in other states. Economies of scale involved in a wood-energy power plant make this particular wood energy product cost effective. Utilities are finding the shorter lead times for wood power plants particularly attractive. The average wood power plant can go from project conception to operation in around 18 months.<sup>38</sup>

A law passed by Congress in 1978, the Public Utilities Regulatory Policies Act (PURPA), stimulated the development of small-scale independent non-utility electric generating facilities. The basic benefit available under PURPA to an independent power producer (using alternative energy sources, including wood or cogeneration) is that the producer is allowed to interconnect with the utility grid and be paid a reasonable rate for the electricity being produced. The small power producer defined and certified by the Federal Energy Regulatory Commission as a qualifying facility is not considered a utility and is therefore not regulated by state or federal authorities. The reasonable rate the small power producer is entitled to is the utility's "avoided cost," or those costs the utility would have incurred if it generated the power.

States were required under PURPA to define the avoided costs and purchased power rates the independent producers would be paid. Rates set by state commissions have varied from below one cent per kilowatt hour to over 12 cents per kilowatt hour.<sup>39</sup> In the last few years some states have reduced rates they originally set for avoided costs. The Federal Energy Regulatory Commission has certified 656 non-utility biomass-fueled electric projects (largely wood-related), having a total capacity of 9,597 megawatts, as qualifying facilities.<sup>40</sup>

Enforcement of PURPA at the federal level is in a state of flux. The Federal Energy Regulatory Commission has issued a series of proposed rule makings, which would make substantial changes in the process of becoming a qualifying facility and in setting the purchased power rates. Many states are already making changes in PURPA procedures

on their own by authorizing utilities to institute competitive bidding for the right to provide new capacity. Twenty-four states have bidding programs that have been enacted or are in the works.<sup>41</sup> It was in a competitive bidding process in Virginia recently that one independent power producer got a contract to provide the state's largest utility with power generated from wood and coal co-firing.

Kentucky, like several states in the Midwest, has currently an excess of utility generating capacity and, consequently, small power production has made no real inroads into the state's electric system. The first attempt to become a qualifying facility in the state was made by a sawmill located in Glasgow. In 1981, Dickerson Lumber Company installed a 1,000 kilowatt cogenerator powered by the mill's sawdust. When negotiations to sell the company's excess capacity to the local electric utility under PURPA rules broke down in 1987, the lumber company brought the case to the Public Service Commission. Seven separate lumber operations in Rowan County, interested in building a ten-megawatt generator to be fueled by sawdust, intervened in the case. The buyback rate sought by Dickerson Lumber Company was 1.7 cents per kilowatt hour. In May of 1988, the Public Service Commission issued its order in the case, setting the avoided purchase or buyback rate at 1.197 cents per kilowatt hour. For comparison purposes, the Tennessee Valley Authority is buying power from 16 small power producers at, according to its published price schedules, purchased power rates of 1.780 to 2.420 cents per kilowatt hour, depending on specific terms of the contract. 42 Dickerson Lumber Company, feeling the buy back rate was not sufficient to cover their costs, shut down the electric portion of their system. They do continue to use sawdust to fuel their boilers.

Private investors are presently considering a 36-megawatt power plant for the Burkesville area, which would use up to 700 tons of sawdust daily. The power generated would be sold to the Tennessee Valley Authority. If this system should go on line, area sawmills would furnish sawdust under long-term contracts. Employment at the plant would be 20 to 25 fulltime employees, not including any truck drivers.<sup>43</sup>

#### **Densification of Wood for Energy Products**

New technologies are reviving interest in wood densification products, such as fuelwood logs and wood pellets. In the densification process mill residues are processed into uniform particles, which are then pressed together under pressure to form a high BTU fuel product. While markets have already been established for those products in the Northwest, the market in the Eastern United States is only now developing. Kentucky is in a prime position to take advantage of its hardwood residues and its access to markets in the East. Ideally wood densification plants could be set up in conjunction with an existing wood industry on the site where residues are being produced. These operations, in most cases, would be relatively small, employing six to nine employees.

## **Compressed Logs**

Fuelwood logs presently on the local market are up to 60% wax. Densified fuelwood logs can now, however, be made totally from wood with no binders or additives. Markets for these products are generally residential. The 100% wood-based log burns cleaner and longer and has a greater BTU output than unprocessed wood. Densified wood in a log form will burn, on the average, three times longer than dry cordwood.<sup>44</sup> As was mentioned in Chapter III, West Virginia has just completed a market study on compressed fuel logs that concludes that the all-wood product could be produced at a price very competitive to firewood sold in urban areas. The state plans to develop a compressed fuel log industry to compete in urban fuel markets in the East.

#### **Wood Pellets**

New, efficient, clean-burning and convenient stoves have renewed interest in the manufacture of pellets from sawdust and other waste. Pellet stoves now on the market burn cleaner at higher temperatures and have a combustion efficiency level of 99.0% compared to 72% efficiency or less for other wood stoves. Fellet stove emissions are generally well below emission standards set by the federal Environmental Protection Agency for particulates. The stoves are convenient. All that is required is dumping pellets once a day or so into a hopper designed to hold 50 to 100 pounds of fuel. Once started, the stove feeds the fuel at a controlled rate. The fire needs no further attention. Many of these stoves have a thermostat to control the temperature and can be vented directly through a side wall rather than through a chimney.

The one drawback to the stoves is their high price—from \$1,200 to \$2,100. Even at these prices pellet stoves still are cost effective for those who cannot cut their own wood and do not have access to cheap wood supplies. The pellets for these stoves are made from sawdust and other mill residues. They are usually about one-fourth inch in diameter, up to one inch long and are packaged in 40-pound bags. One pellet manufacturer reports an average cost using the wood pellets to be \$300 per year.<sup>46</sup>

Pellets and pellet stoves have proliferated in the Northwest in the last four years. In the survey conducted of other states, Idaho reported much of its sawdust was being used for pellet production. In the East, however, the situation seems to be the old chicken or the egg dilemma. Until stoves penetrate the market, prospective manufacturers are reluctant to start producing pellets. Customers are reluctant to buy stoves unless they can be sure of the availability of fuel. Missouri is attempting to break this cycle by importing pellets from the Northwest. They plan to subsidize the cost of the pellets by covering the import costs with oil overcharge monies and selling the pellets at what the retail price would be if the pellets were produced locally. Once a market is developed, pellet manufacturers will locate in the state.

Stoves being marketed now in Kentucky to burn corn can also burn wood pellets and could be the first step in developing a wood pellet market in this state. Of the surrounding states, however, only Missouri and Tennessee produce pellets, with one plant each.

# Other Wood Energy Conversions

#### Charcoal

After pulp and paper mills, the charcoal industry is the biggest user of sawdust in the state. The Kingsford charcoal plant, located in Burnside, within the Fifth Congressional District, is probably the reason that district, the largest generator of mill residues, is not the area of the state with the greatest amount of unutilized residues. Even though charcoal alternates such as gas grills, have increased significantly, there is still a demand for charcoal. A new charcoal plant will soon locate in the Burkesville area in Western Kentucky, for example, and will use 300 tons of sawdust daily.

# **Emerging Technologies: Liquefaction and Gasification**

Emerging fuelwood technologies could mean that liquid and gaseous fuel production facilities based on wood waste may at some point in the future be placed in Kentucky to take advantage of its hardwood residues. While the costs associated with using wood as a feedstock for ethanol production are not now economically competitive with other feedstocks, such as corn, the feedstock may well be cost competitive in the future. The Solar Energy Research Institute's projected costs of wood-based ethanol have dropped from \$4.00 per gallon to \$1.35 per gallon in a ten-year period.<sup>47</sup> Both the Solar Energy Research Institute and the Tennessee Valley Authority are conducting research on wood-based ethanol. The Tennessee Valley Authority is currently operating a pilot fuel alcohol facility in Alabama that uses two tons of wood daily.

Although most pulp and paper mills are burning woodwaste for fuel, Louisiana-Pacific contracted with another company, Pyrotech, to convert their wood waste into oil before generating energy at a sawmill site in California. Pyrotech is using a chemical process, pyrolysis, to produce the oil from wood and is also producing charcoal briquettes as a byproduct of the conversion process. If the price of petroleum should go up, there will be, undoubtedly, much interest throughout the country in this process. In 1986 Kentucky used part of its grant monies from the Southeastern Regional Energy Biomass Program to install a low-BTU gasification unit using wood chips to dry grain at a farm. Although labor time increased with the unit, fuel costs were reduced.

#### **CHAPTER VI**

#### RESOURCES AND OPTIONS

In the search for ways to alleviate wood waste disposal problems, two approaches emerge as most effective in addressing the industry's problems and at the same time affecting the state's economy and environment in a positive manner. These two approaches are:

- (1) encouraging the use of wood waste in manufacturing processes; and
- (2) encouraging energy production from wood waste.

This chapter identifies key resources which, if one or both approaches are used, could be tapped in order to accomplish the goal of reducing Kentucky's unutilized wood residues. A final section of this chapter discusses possible state policies that could also further that goal.

The state is fortunate in having a variety of resources, including technical expertise, programs, and funding, both within and outside of state government, which could be used to focus more directly on the wood waste problem.

# **State Programs**

# **Forestry Division**

A key resource to address the problem is the Forest Products Utilization Program, located within the Forestry Division of the Department for Natural Resources, Cabinet for Natural Resources and Environmental Protection. This program provides technical assistance to both the primary and secondary wood industries. As a part of this effort, the program tries to link wood waste usage to wood waste producers. Staff in this program provided testimony to the Public Service Commission during the hearings on the Dickerson Lumber Company cogeneration case as to the amount of wood waste available in the state for energy production. The most recent effort of this agency regarding wood waste is the residue utilization survey discussed in Chapter II.

If this program is to play a major role in increased efforts to reduce wood waste—and stimulate the growth of the secondary wood industry—it should be fully staffed. Recognizing the importance of the work of the Forest Products Utilization Program, the General Assembly included specific funding in its 1986-87 biennium budget for three foresters to work part-time for the wood utilization program, in addition to the three full-time products utilization foresters already placed out in the state. One of the positions assigned part-time to the utilization program has been vacant for a year. Until a year ago the central office had two full-time employees. When the program coordinator retired last year, the specialist was promoted to the coordinator position, leaving the specialist

position vacant. Due to other competing needs of the Division, it is likely that this position will not be filled.

### **Division of Energy**

The other key state agency that could be instrumental in implementing a strategy to reduce wood waste is the Division of Energy, now in the Department for Natural Resources. This newly created division is the result of the Governor's reorganization order which moved both the Alternate Energy Division and the Conservation Division from the Energy Cabinet to the Natural Resources and Environmental Protection Cabinet. The Division of Energy will presumably continue the legislative mandate set out in KRS 152A.125 for the Division of Alternate Energy to promote production of energy from biomass. However, staffing may also be a problem for full utilization of this agency. At this time only three positions, one of them unfilled, are assigned to cover the alternate energy function, which includes a number of alternate energy technologies besides wood energy. This division has administrative duties concerning the next four programs discussed. Placement of this agency in the same Department as Forestry should enhance coordination of their overlapping goals concerning wood waste issues.

# Alternate Energy Development Fund

Established by the 1982 General Assembly with part of Kentucky's first receipt of oil overcharge monies, the Alternate Energy Fund is a grant program promoting renewable energy technologies, including wood energy. Of the ten projects funded and implemented by the fund, one was a wood-waste-to-energy project at a local veneer mill. The \$10,000 remaining in the Alternate Energy Development Fund could be specifically earmarked for a wood waste energy project.

#### Southeastern Regional Biomass Energy Program

Each year the state receives a small grant, \$20,000 to \$25,000, from the Southeastern Regional Biomass Energy Program, funded by the U.S. Department of Energy. The Division of Energy is the administrative body for the biomass funds, which are to be used for biomass demonstration projects or other promotional activities.

In the past the biomass monies were used to develop a wood energy publication, Wood Energy in Kentucky—A Guide for Industry; to fund the feasibility study for Morehead State University on the burning of a mix of coal and wood; and to demonstrate wood gasification for agricultural purposes. In the past two funding cycles, however, solid waste energy projects were awarded the grant monies.

One spending option for the biomass monies utilized by a few states is funding a biomass or wood energy specialist position to work inside of state government. Spending the funds on an in-house promoter of wood energy could conceivably develop more wood energy projects in the long run than using the grant monies for seed money for one project. The federal biomass funds must be matched with funds from other sources or in-kind services on a 50/50 basis at a minimum.

# State Energy Conservation Program/Energy Extension Service

Both the Kentucky Energy Conservation Plan and the Energy Extension Service are federal grant programs from the U.S. Department of Energy. The state administering agency, the Division of Energy, selects program measures, in addition to certain required measures, to implement, with the goal being the saving of energy. States have a great deal of discretion on what projects to undertake and, consequently, programs vary considerably from state to state. Although Kentucky's activities under these two programs have not targeted wood energy specifically, other states have funded demonstration projects and low-cost revolving loan programs for the wood-energy systems. Under a new program rule, these federal funds can now be used for demonstration projects in state facilities. Funding for these programs is dwindling, however. It should be noted that a number of programs are funded with these monies on an ongoing basis; these programs could be hurt if the state should decide to reallocate some of the monies for wood waste energy projects. Current federal funding for the combined program is \$230,400, and a 20% match is required.

# **Institutional Conservation Program**

While the Institutional Conservation Program has not been used in this state for wood energy projects, it could in the future be an important vehicle for such projects. This program is also an annual grant program funded by the U.S. Department of Energy and administered by the Division of Energy. The program goal is to save energy in public and private non-profit schools (including colleges and universities) and hospitals. Usually, 50% of the total costs of implementing conservation measures for participating institutions are provided through the grant funds. Funding almost doubled when the 1988 General Assembly appropriated an additional \$1 million in oil overcharge monies to this program for the biennium. Because of the demand for these monies, projects for funding are selected through a ranking process, based primarily on length of payback and type of fuel being saved. This program could conceivably be used to implement a project like the Morehead State University boiler retrofit to burn wood and coal.

#### **Public Service Commission**

The role the Public Service Commission could play in encouraging development of electric power from wood waste is at this time limited, because of current excess electric capacity, power plant projects still in construction phase or delayed, and the current uncertainty at the Federal Energy Regulatory Commission over enforcement of the Public Utilities Regulatory Policy Act. Still, it should be noted that the Public Service Commission would be in a pivotal position in a utility rate hearing for allowing or disallowing costs associated with modifications of a coal-fired electric generating system to enable the burning of wood waste with coal.

# Community Development Block Grant

Community Development Block Grant funds are federal funds allocated by the U.S. Housing and Urban Development agency. Kentucky's allocation for 1989 is \$10 million,

with forty percent of the allocation designated for economic development projects. These funds go to cities and counties and can be used to construct publicly-owned facilities for the benefit of a job producer or for loans up to \$1 million to a private-for-profit entity. These monies could conceivably be used to develop an industrial park fueled by wood waste or to attract a wood processing plant. Selection of projects is done by a committee composed of the Commissioner of Local Government, the Secretary of the Economic Development Cabinet and citizen members. Emphasis is on job creation or retention; jobs must go to persons from low-and moderate-income families.

# **Economic Development Financing Programs**

Three state-funded economic development programs with low-cost loans are in place to attract wood-waste-using industries to the state: the Kentucky Development Finance Authority (KDFA); the Economic Development Bond Program; and the Kentucky Infrastructure Authority. These three programs have almost \$108 million available for Fiscal Year 1990.

Two new programs which could assist companies interested in utilizing wood waste, the Kentucky Rural Economic Development Authority and the Commonwealth Venture Fund, were established by the 1988 General Assembly and will soon be in operation. The Kentucky Rural Economic Development Authority will target counties experiencing higher rates of unemployment than the state average, some of the same counties with large amounts of unutilized mill residues. Companies eligible for the fund will be obligated to pay debt service on revenue bonds issued for site acquisition and construction costs, but will receive a 100% state income tax credit on income generated from the project, not to exceed the debt service. The Commonwealth Venture Fund was established to encourage the development of new products and new technology. The fund is to be financed by private investors, who will receive an income tax credit equal to as much as 40% of their investment. Once it is established, 20% of the fund's assets will go to agriculture-related businesses.

Guidelines for accessing these funds and the Community Development Block Grant monies may impede smaller wood waste using companies, receiving financial assistance. Job creation is a central criteria for financial assistance from these programs. The amounts of loans or grants made are based on the number of jobs created or retained. The KDFA board's policy, for example, in three of the four program funds is to provide \$10,000 in loans for each job created or retained. The loan guideline for the Economic Development Bond program is \$5,000 per job created or retained. While this limit would not be a problem for some large wood waste users, such as pulp mills and particleboard manufacturers, it would be a problem for a small pellet manufacturer facing high start-up costs, creating only a few new jobs, but using substantial amounts of wood residues. It is uncertain how much flexibility there is in the guidelines of the programs. There does need to be recognition in the funding process of these programs of the number of indirect jobs created or retained and the positive environmental impact such companies can make.

The legislature also provides annual funding (\$5,000,000 in Fiscal Year 1989) for the Area Development Fund, a capital improvement grant program, that can be used for development of industrial sites, acquisition of property, and construction of buildings. Funds are allocated to Kentucky's fifteen Area Development Districts (ADDS) based on population, per capita income, and manufacturing jobs.

In addition to these state-funded programs, the state administers a loan program for the Small Business Administration and the Appalachian Regional Commission's industrial grant program for public projects, including industrial site development, in Kentucky's Appalachian counties.

# **University Programs**

Research and technical assistance at the state's universities should not be overlooked. Since Morehead State University is located in the area with the most serious wood waste problem, it is most appropriate that resources at this university be applied to the problem. Morehead is already focusing on the wood-using industry. The university received funding this past year from the Appalachian Regional Commission to (1) conduct a comprehensive market analysis of Kentucky's forest products industry; and (2) hire a wood technologist to assist in recruitment and expansion of wood-using industries in the area.

Several different departments at the University of Kentucky could be part of any state effort to reduce unutilized mill residues. The Forestry Department was part of a previous successful effort to find markets for bark. The Department could now focus on utilization of other mill residues, particularly sawdust. Research on the composting of sawdust, for example, could be conducted by the Forestry Department in conjunction with the University's Agricultural Experiment Station. The Agricultural Cooperative Extension Service, through its public service programs and work with farmers, could be utilized to encourage the use of local sawdust, particularly the older sawdust that has piled up on sawmill sites. Both the University of Kentucky's Center for Applied Energy Research and the Energy Laboratory have resources to conduct research on wood waste energy projects, such as the co-blending of coal and wood waste.

# The Farmlot Electronic Billboard Service

Currently the only formal link between wood waste producers and potential wood waste users is the *Primary Wood Industries Directory* published annually by the Division of Forestry. This listing is probably used only by those users of wood waste who are in the forest product industry themselves. Word of mouth is more likely the source used for locating supplies of low-priced or free mill residues. *Farmlot*, the Department of Agriculture's computer service for buying or selling farm commodities, accessed by telephone, could be employed as part of a larger effort on the part of the universities to increase use of sawdust for agricultural and horticultural purposes.

## Oil Overcharge Monies

More than one state in the interviews discussed in Chapter III reported using oil overcharge funds to address unused mill residues. These monies were received by states as the result of court settlements concerning alleged oil price violations. The 1988 General Assembly devised a spending formula for the over \$40 million in oil overcharge funds received by this state. The formula, anticipating disbursement of all funds within a tenyear period, divides the funds between the Low-Income Home Energy Assistance Program, the Weatherization Assistance Program, and the Institutional Conservation Program, leaving no surplus for other purposes.

It is assumed that there would be great reluctance to alter the oil overcharge expenditure formula, but it should be noted that these monies could be used for wood waste-to-energy demonstration projects, for revolving energy loans for wood energy systems, and for technical assistance programs geared towards the utilization of mill residue for energy production.

Programs currently earmarked for oil overcharge monies could possibly incorporate a wood waste-to-energy function. For example, part of the oil overcharge appropriation made for the next biennium through the Institutional Conservation Program could be specifically tagged for retrofit of an institution's energy system to burn sawdust or a blend of sawdust and coal. Or part of the monies to be appropriated for energy assistance could be used to place wood pellet stoves in the homes of low-income elderly participants.

### Other Resources

Funding for research, demonstration projects, and technical assistance could be applied for on the part of either state agencies or universities from both federal and private sources. Potential sources for funding projects relating to the utilization of wood residues or wood-burning technologies include: the U.S. Forest Service, the Tennessee Valley Authority, the U.S. Department of Energy, the U.S. Economic Development Administration, the Farmers Home Administration, the Appalachian Regional Commission, the National Science Foundation, and the Electric Power Research Institute.

In addition, cities and counties are authorized by KRS 103.246 to issue industrial revenue bonds to finance pollution control facilities for industrial concerns and utility companies. Although it has not been attempted in this state, it is possible that a wood-burning energy facility could be financed through such a bond issue, if the facility burned primarily waste wood.

## **State Energy Policy**

While there are a number of programs with incentives that could be used to induce new manufacturing concerns using wood residues to locate in Kentucky, few incentives exist in the state for converting energy systems to burn wood waste. The state may want to provide such incentives by formulating new energy policies. States have sought to influence, particularly since the oil embargo of 1973, how much and what type of energy is used within state borders. Tools states use to influence energy use include technical assistance, tax incentives, loans and grants, research, and demonstration projects in public buildings.

In the early eighties Kentucky funded a grant program for alternate energy demonstration projects and offered temporarily a tax credit for purchase and installation of residential or commercial wind, geothermal, and solar systems. One energy policy adopted by the 1982 General Assembly but never fully implemented was a joint resolution (1982 Acts, Chapter 287, p. 777) directing the Finance Cabinet to amend regulations to require consideration of conservation and demonstrations of coal, and solar and biomass energy systems in state facilities.

Since the big barrier to increased use of industrial wood energy systems appears to be the initial costs of the equipment, increased use of wood waste for energy purposes may depend on a loan program or a tax incentive. A bill considered but not enacted by the 1986 Kentucky General Assembly and based on a North Carolina law would have provided a 15% corporate income tax credit on the costs associated with installation or modification of a system to burn wood or coal.

Because coal is such an important natural resource to this state, most state energy policy centers around coal. One incentive the state provides for coal burning might also be used to promote energy from wood waste, however. The incentive is designed to encourage the burning of coal in state facilities. Before any large energy-using component (3,000,000 BTU's per hour heat input or more) can be installed or retrofitted for any fuel other than coal in a state facility, the Office for Coal and Energy Policy must, according to KRS 45.360, conduct an economic feasibility analysis, using life-cycle costing to compare the proposed project costs to those of a comparable system using coal. The project cannot proceed until the Energy Cabinet certifies the project's energy source to be the "economic" choice.

# **Energy Performance Contracting**

A fairly new approach to financing energy saving measures in a state's own facilities, which could be applied to wood energy conversion systems—and to coal systems for that matter—is energy performance contracting. This is an arrangement whereby a building owner, the state in this case, contracts with a firm for installation of energy services, including engineering design, equipment procurement, installation, financing, and maintenance. The fee for such service is based on the actual value of reduced energy consumption resulting from the services.

This financing system is especially attractive to local school systems. Average annual energy savings to state schools participating in the Institutional Conservation Program are estimated to be 24%.<sup>47</sup> Funding for this program is not sufficient to meet

demand. If the state could develop a performance-based financing system, schools could implement energy cost savings measures now instead of remaining on the waiting list for funding from the Institutional Conservation Program. School energy dollars could thus be freed up sooner for expenditure on education programs.

There may be constitutional barriers, as well as statutory barriers, to the state's use of energy performance contracting. Constitutional provisions do limit the power of both state and local governments to contract debt. Such contracting requires more room for negotiation than the state's present competitive bidding system may allow. Before energy performance contracting can be implemented in this state, there needs to be a thorough study of the concept, identification of any statutory or constitutional barriers, and development of a model contract to ensure that the state's interest in such financing is protected.

In his presentation of an energy plan for Kentucky made to the Task Force on Energy on March 28, 1989, George Evans, Executive Director of the Governor's Office for Coal and Energy Development, identified the need for lease/purchase agreements for state acquisition of coal-fired boilers and other energy cost-saving equipment for state and local agencies. The plan also calls for a wood and wood/coal demonstration program for industry and state facilities presently using natural gas, oil, or electricity for steam production.

## **CHAPTER VII**

#### RECOMMENDATIONS

During the Task Force's deliberations on wood waste, a number of state agencies, including the Economic Development Cabinet, the Council on Higher Education, the Department for Local Government, the Department of Agriculture, the University of Kentucky, Morehead State University, the Department for Natural Resources and the Department for Facilities Management were asked to provide written responses to the proposed recommendations under consideration by the Task Force. At its June 27 meeting, the Task Force adopted sixteen recommendations. Each of the recommendations addresses one of three goals: (1) encouraging further development of industries which use wood waste; (2) encouraging the use of wood waste for energy production; or (3) reducing the mounds of wood waste already stockpiled by the industry. The recommendations adopted by the Task Force incorporate those recommendations suggested by the Committee of Environmental Regulations and Wood Waste of the Governor's Task Force on the Forest Products Industry. The adopted recommendations follow.

- 1. Any effort to address the wood waste problem should be done in conjunction with efforts underway to expand the secondary forest products industry. The state Economic Development Cabinet should use its economic development funds to encourage integrated wood industry operations where wood waste would be processed on the site or adjacent to the site where it is produced.
- 2. The state Economic Development Cabinet should seek a pulp and papermill, particleboard manufacturer, or other large user of wood waste to locate in Eastern Kentucky.
- 3. Those in the wood industry who will benefit from the creation of a new outlet for their wood waste should be encouraged to either share in the costs of any incentive package offered to land a user of wood waste or agree to make available at no charge their wood waste for a specified time period.
- 4. A demonstration project should be developed with economic development funds to establish an industrial park in which energy for occupants of the park comes from wood waste.
- 5. Guidelines for selection of projects to fund with state economic development monies should include consideration of environmental benefits and the indirect effects on job creation and retention.
- 6. The old sawdust piles have little energy value and need special attention.

  The University of Kentucky's Agricultural Cooperative Extension Service, in conjunction with the state Department of Agriculture, should embark on

- an educational campaign to encourage nurseries and farmers to utilize more sawdust in horticultural activities.
- 7. The state's universities should be encouraged to seek federal and private funding for research relating to wood waste products and wood waste energy production.
- 8. The state should use its funds from the Southeastern Regional Energy Biomass Program to fund a wood energy specialist position. The wood energy specialist could operate out of the Forestry Division, the Conservation and Alternate Energy Division, or under a shared arrangement between the two agencies. The wood energy specialist would continue the state's recent effort to document mill residues, identify companies for wood energy conversion, and provide market, financial, and technical assistance in using wood waste for energy purposes.
- 9. KRS 45.360 should be amended to require life cycle costing analyses of wood energy systems before conventional energy systems are installed or modified in state facilities. (KRS 45.360 already requires such consideration be given to coal systems.)
- 10. The state should proceed with the Morehead State University boiler retrofit to burn a blend of coal and sawdust for space heating purposes. A research and demonstration component, documenting the effects on emissions of cofiring wood and coal in various proportions, should be included in the retrofit project. Federal and private funding should be sought to assist in financing the project.
- 11. A corporate income tax credit based on equipment and installation costs should be offered to industries installing or modifying systems to burn either wood waste or a blend of wood waste and coal.
- 12. A revolving loan fund should be established to assist industries wanting to convert from oil and gas to wood waste energy systems.
- 13. Monies should be appropriated from the oil overcharge trust fund to provide:

  (a) funding for the Morehead State University boiler retrofit project (recommendation #10), and/or (b) grant monies for industries wanting to convert from oil and gas to wood waste energy systems.
- 14. The Conservation and Alternate Energy Division, with the assistance of the Finance and Administration Cabinet, should develop a plan to implement energy performance contracting in state facilities. This plan should include:

  (1) identification of any statutory changes needed in order for the state to

participate in an energy performance contract, and (2) development of a model contract.

- 15. The Conservation and Alternate Energy Division should be encouraged to develop a wood waste energy program measure in either the state Energy Conservation Plan or the Energy Extension Service.
- 16. The \$10,000 remaining in the Alternate Energy Development Fund should be used for the promotion of wood waste energy. These funds could be used in conjunction with efforts suggested in the other recommendations.

Attention is increasingly being given to the opportunities within the forest products industry to stimulate the state's rural economy. It is the Task Force's belief that implementation of these recommendations will not only eliminate a serious liability for the forest products industry but could, in the process, turn that liability into a valuable resource.

### **FOOTNOTES**

- 1. 1974 Production: James T. Bones and Chauncey J. Lohr, *The Timber Industries of Kentucky* (USDA Forest Service Resource Bulletin NE-50, 1977), p. 3; 1988 Production: Phone Interview with Steve Kayse, Wood Utilization Program Coordinator, Division of Forestry, Department for Natural Resources, Natural Resources and Environmental Protection Cabinet, April 1989.
- 2. Frank Crews, President of the Forest Industries Association, in testimony before the Interim Joint Committee on Energy, 24 October 1988.
  - 3. Ibid.
- 4. Bob Fouts, Research and Planning Division, Economic Development Cabinet, in presentation at the Forest Products Industry Conference, 14 October 1987.
- 5. Morehead State University, Kentucky Forest Products Industry Development Plan—Phase 1, November, 1987, page 4.
- 6. S. Joseph Chang and Daniel P. McCoy, *The Declining Secondary Wood-Using Industries in Kentucky: An Economic Analysis*, Report prepared for the Kentucky Department of Commerce (1 June 1981), p. 7.
- 7. David Tillman, Forest Products: Advanced Technologies and Economic Analysis, (Orlando: Academic Press, Inc., 1985), p. 3.
- 8. Kentucky Division for Air Quality, Department for Environmental Protection, Natural Resources and Environmental Protection Cabinet, 1988 Data Base Kentucky Emissions Inventory System: Wood Waste Incinerators, 8 December 1988.
- 9. Letter from Frank Lassiter, Executive Director, Kentucky Forest Industries Association, 28 February 1989.
- 10. Phone interview with Mr. Shelby Jett, Division of Waste Management, Department for Environmental Protection, Natural Resources and Environmental Protection Cabinet, 13 April 1989.
- 11. Letter from Robert Bauer, Wood Specialist, Morehead State University, 30 March, 1989.
- 12. Interview with Frank Lassiter, Executive Director, Kentucky Forest Industries Association, 21 June 1988.
  - 13. "Self-Generation is the Key," Biologue, 5, No. 2 (1988), p. 4.

- 14. Timothy M. Young and David M. Ostermeier, "A Survey of Nonforest Products Industrial Wood Energy Users," *Forest Products Journal*, 37, No. 2, (1987), p. 57.
- 15. Mary Lynn Collins and Linda Kubala, Kentucky's Wood-Using Industries: Prospects for Expansion, Research Report No. 188, (Frankfort, Kentucky: Legislative Research Commission, January 1982), p. 44.
- 16. Kentucky Division for Air Quality, Department for Environmental Protection, Natural Resources and Environmental Protection Cabinet, 1988 Data Base Kentucky Emissions Inventory System: Wood Fired Boilers, 8 December 1988.
- 17. Interviews with Bob Fouts, Research and Planning Division, Economic Development Cabinet, 8 June 1988, and C. J. Lohr, Wood Utilization Program Coordinator, Division of Forestry, Department for Natural Resources, 19 July 1988; Steve Kayse, Wood Utilization Program Coordinator, Division of Forestry, Department of Natural Resources, in testimony presented before the Interim Joint Committee on Energy, 24 October 1988.
- 18. Phone interview with Andy Baker, Forest Products Laboratory, U.S. Forestry Service, 26 April 1989.
- 19. Weyerhaeuser Company, "Pollution Prevention Challenge Grant: Project Summary," December 1986.
- 20. Phone interview with Steve Puccio, Plant Manager, Northeastern Products Corporation, 27 April 1989.
- 21. William M. Whitaker and Bernard Davis, Comprehensive Market Analysis of the Kentucky Wood Products Industry, (Morehead, Kentucky: Morehead State University, April 1989), p. 109.
  - 22. "United States Particleboard," U.S. Industrial Outlook, January 1987.
- 23. John R. O'Brien, "The Tunnel Reactor, The Flexible In-Vessel Composting System," paper presented at the 16th National Conference on Municipal Treatment Plant Sludge Management, Orlando, Florida, 29 May 1986.
  - 24. "New Uses for Biomass," Bio-Joule, March 1988, p. 8.
- 25. Richard E. DeZeeuw and others, *Permits—Regulations for Biomass Energy Facilities in the Southeast*, prepared for Tennessee Valley Authority, Southeastern Regional Biomass Energy Program (Portland, Oregon: Nero and Associates, August 1986), p. 2.
- 26. Carol Wallace, *Wood Energy in Kentucky—A Guide for Industry*, (Lexington, Kentucky: Kentucky Energy Cabinet August 1986) p. 10.

- 27. Kentucky Division for Air Quality, 1988 Data Base Kentucky Emissions Inventory System: Wood Fired Boilers, 8 December 1988.
  - 28. Kentucky Energy Cabinet, p. 5.
- 29. Linda L. Gaines, "Economic Consideration of Coal and Wood for Industrial Steam Generation," paper presented at the Energy from Biomass and Wastes Conference IX, Lake Buena Vista, Florida, 28 January-1 February 1985, p. 10.
- 30. Meridian Corporation, Case Studies of Biomass Energy Facilities in the Southeastern U.S., prepared for Tennessee Valley Authority, Southeastern Regional Biomass Energy Program (Falls Church, Virginia: Meridian Corporation, August 1986).
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- 33. Boston Planning Group, Wood-Coal Co-utilization in the Northeast: Technology Assessment and Case Studies, prepared for the Coalition of Northeastern Governors Policy Research Center (Boston, Massachusetts: Boston Planning Group, March 1984).
- 34. Wayne A. Helmer, et al., "Effect of Wood-to-Coal Fuel Percent and Underfire Air on Sulphur Emissions and Percent Fuel Energy Loss During Cofiring of Wood and Coal," Forest Products Journal 38, No. 11/12 (1988), p. 49.
  - 35. Meridian Corporation, p. 45.
- 36. John S. King, M. Dwayne Buckles, and James E. Jones, Wood Fired Boiler Study for Morehead State University, (Lexington, Kentucky: Mason and Hanger Engineering, Inc., December 1987), p. 6.
- 37. C. J. Lohr, Wood Utilization Program Coordinator, Forestry Division, Department for Natural Resources, Natural Resources and Environmental Protection Cabinet, a life-cycle costing analysis applied to the wood fired boiler study for Morehead State University, undated.
- 38. David Rinebolt, "Wood: Power for the Future," Public Power 46, No. 6 (1988), p. 38.
- 39. Donald Marier and Larry Stoiaken, "Surviving the Coming Industry Shakeout," Alternate Sources of Energy No. 91 (1987), p. 10.

- 40. Phone interview with Charles Ruder, Federal Energy Regulatory Commission, 20 April 1989. These numbers, current as of September 1988, represent the number of facilities certified by the Commission and may include facilities which were cancelled after receiving certification.
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- 43. Phone interview with Jack Reynolds, Obernon Resources Corporation, 3 January 1989.
- 44. Curt C. Hassler et al., Evaluating a Wood Densification System for Producing Fuelwood Logs, submitted to West Virginia Fuel and Energy Office, November 1988, pp. 1-2.
- 45. Sue Froeschle and R. J. Gyllenborg, Western Power Administration, "Pellets: Clean Wood for Residential Applications," *Biologue* 5, No. 3, 1989, p. 22.
  - 46. "TVA Fuels Sawdust Market," Timber Processing, April 1988, p. 37.
  - 47. "Driving Under the Influence," World Watch, January/February 1989, p. 38.
- 48. The Pendragon Group, *The Weatherization Assistance Program and Other Conservation Efforts in Kentucky*, prepared for the Legislative Research Commission, April 1989, p. 78.

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# **APPENDICES**

# IN HOUSE

### REGULAR SESSION 1988

HOUSE RESOLUTION NO. 163
TUESDAY, MARCH 15, 1988

Representatives Bobby H. Richardson and Walter Blevins, Jr. introduced the following resolution which was ordered to be printed.

A RESOLUTION directing the Interim Joint Committee on Energy to study the problems associated with the disposal of wood waste generated by the forest products industry.

WHEREAS, Kentucky is the nation's fourth largest producer of hardwoods; and

WHEREAS, the state's forest products industry currently generates over seven hundred and seventy-three million dollars (\$773,000,000) in annual sales; and

WHEREAS, the average wood producer in the state produces in excess of twenty (20) tons of sawdust per day; and

WHEREAS, the industry is restricted by current environmental standards as to the disposal of the wood waste; and

WHEREAS, the problems associated with the disposal of wood waste threatens the existing forest products industry and is hampering further expansion of the industry; and

WHEREAS, there are forty-eight (48) boilers in the state that use wood waste as a fuel source and great potential exists to increase this number;

NOW, THEREFORE,

## Be it resolved by the House of Representatives of the General Assembly of the Commonwealth of Kentucky:

Section 1. That the Interim Joint Committee on

#### 88 RS BR 2637

- 1 Energy is directed to study the problems associated with
- 2 the disposal of wood waste generated by the forest
- 3 products industry. In its study, the committee should
- 4 consider all alternatives to ease wood waste disposal
- 5 problems, including the generation of energy from wood
- 6 waste.
- 7 Section 2. That the Interim Joint Committee on
- 8 Energy shall submit a report and recommendations to the
- 9 Legislative Research Commission no later than August 31,
- 10 1989.
- 11 Section 3. Staff services to be utilized in
- completing this study are estimated to cost \$20,000. These
- 13 staff services shall be provided from the regular
- 14 commission budget and are subject to the limitations and
- other responsibilities of the Commission.

#### Appendix B

## INTERIM JOINT COMMITTEE ON ENERGY

## Minutes of the Third Meeting of the 1988-89 Interim

October 24-25, 1988

The third meeting of the Interim Joint Committee on Energy was held on Monday, October 24, in the Riggle Room at the Adron Doran University Center in Morehead at 7:30 p.m. Senator Delbert Murphy, acting Chairman, called the meeting to order, and the secretary called the roll.

#### Present were:

Members: Senator Delbert Murphy, acting Chairman, Senators William "Bill" Brinkley, Greg Higdon, John Rogers, and Eugene Stuart; and Representatives Eddie Ballard, Jerry Bronger, Dick Castleman, Chester Gregory, Steve Keith, Ronny Layman, Mark O'Brien, A. G. Pritchett, Paul Richardson, and James Yates.

Guests: Dean Charles Derrickson, Charles Nelson Grote, and Keith Kappes, Morehead State University; Representative Walter Blevins; Senator Woody May; Michael W. Jenkins, MACED; George Siemens, Louisville Gas & Electric; Randy Byrd, Kentucky Power Cooperative; Hank List, Kentucky Utilities; Dan Yates, Kentucky Association of Electric Cooperatives; Barry Mayfield, East Kentucky Power; Frank Lassiter, Steve Kayse, and Frank Crews, Kentucky Forest Industries Association; Sharron Jackson, Council on Higher Education; and Billie Clayton, Rowan County Schools.

LRC Staff: Linda Kubala, Mary Lynn Collins, Don Stosberg, John D. Hurter, and Diana Lynn Hill.

Press: Morehead News.

Senator Murphy called for the approval of the minutes of the September 27 meeting. The minutes were approved without objection.

Senator Murphy thanked Dr. Grote, Morehead University President, for the hospitality and meal given by Morehead State University. He then recognized Dr. Grote, who welcomed the committee to the university.

The first item on the agenda was the discussion of wood waste disposal problems of the forest products industry. Mr. Steve Kayse, Acting Chief of Forest Products in the Division of Forestry was the first speaker. Mr. Kayse said the division's biggest job was to assist and serve the forest products industries in Kentucky. The 1988 General Assembly enacted HJR 122, which directed the Division of Forestry to establish a data base of the forest products industry to get a better handle on lumber production and quality for economic development. Mr. Kayse said the Division will, as a part of the data

base effort, be able to provide information for the Energy Committee on the wood residue problem, which is a problem throughout the state.

The next speaker on the agenda was Mr. Frank Crews, President of the Kentucky Forest Industries Association. Mr. Crews said the Association has a membership of over 400 people in the wood producing industry in Kentucky. Mr. Crews has a mill in operation in Kentucky and one in Tennessee. He said that wood waste is the biggest problem he has. He said that a few years ago they were able to burn sawdust with a teepee burner, which cannot be used anymore. He is able to sell one trailer load of sawdust to a pulp and paper mill in Hawesville every two weeks, but in his operation in Kentucky he producs eight trailer loads of sawdust during that period. He said he loses approximately \$23 per load by sending it to Hawesville but that he has no cheaper alternative for disposing of the wood waste. He said Kentucky has approximately 1,000 manufacturing plants in the primary and secondary segments of the wood industry. The contribution by the industry for 1987-1988 was approximately \$890 approximately 24,000 full-time employs industry employees. He said that between 1978 and 1983, Kentucky lost 164 slow-down of business, primarily due to the plants secondary workers' compensation rates, and Kentucky's lack of skilled labor. He said Kentucky is behind all bordering states except West Virginia in the secondary wood industry. On the other hand, he said Kentucky would produce 800 million board feet of lumber this year, making the state the fourth largest hardwood producer in the United States. About one ton of waste is produced for every 1,000 board foot of lumber produced, which translates into 800,000 tons of wood waste a While the primary industry has increased production consequently the amount of wood waste generated, the traditional users of wood waste, such as paper companies, have not increased their production or need for the wood waste. He said if anyone in the secondary wood manufacturing business is thinking of expansion they are going to be restricted by their ability to dispose of their wood waste.

Mr. Jim Wells of the J. C. Wells and Sons, Inc. was the next speaker. He has mills in Rowan County, Fleming County and Menifee County. He said sawdust has always been a major problem for his operation. They produce approximately 40 tons of sawdust per day at one mill. He said in the 1950's they would blow the sawdust on the ground and burn it, but the Environmental Protection Agency (EPA) said this was illegal and recommended the teepee burner. On the EPA's recommendation, Mr. Wells purchased a burner for approximately \$25,000 in 1968. In 1969 the EPA came back and said the burner was not burning in compliance. From 1973 until 1978 Mr. Wells received 15 citations at \$10,000 per fine for air pollution, which the EPA turned over for legal action. The company has negotiated with the EPA and has paid a \$5,000 fine toward the 15 citations. He said that by November 29 they must have the teepee burner in compliance or be shut down. Mr. Wells said in order to be in compliance it would cost approximately \$15,000 per year for maintenance of the burner. They have purchased a \$40,000 loading system to get the sawdust loaded on a truck and are hoping to sell the sawdust. During the time they have had the teepee burner there have been outside markets for

sawdust, but they have not been in the market because they have been burning the sawdust. He said the sawdust problem was the biggest problem they have had and it is growing each day.

The next speaker was Mr. Rick Armstrong, part owner of Homer Gregory Lumber Company of Morehead. Mr. Armstrong said they have a dry kiln, which is a further step in the processing of hardwood lumber. He said they burn their wood waste in the kiln to generate the steam used to dry the lumber. They need 15 tons of sawdust per day, which is about what they produce. He said he would like to have a much larger sawmill where he could employ more people but he cannot expand unless he has outlets for the additional waste which would be generated. He said they had a teepee burner but when the environmentalists came through and asked them to stop burning, they tore the teepee burner down and took the sawdust to another property site. After five or six years, however, the sawdust pile caught on fire. He pointed out that they are now successfully using sawdust as an energy source. He said that to a large extent they operate within all air pollution laws and guidelines. The other point he made was that in surrounding counties within a 40 or 50 mile radius of Morehead, there are 25 to 35 small mills cutting every day and dumping sawdust over hillsides. He said the small mills do not have the capital or expertise to solve their waste problem. He pointed out that sawdust is abundant and relatively cheap and needs to be exploited in some form. He said there needs to be a joint effort of all concerned parties.

Senator Murphy thanked the speakers and opened the floor up for questions.

Representative Bronger asked Mr. Wells about compressing sawdust for fire logs. Mr. Wells said that was still done, but the market is low and the initial cost is high.

Representative Richardson asked Mr. Kayse what other states do to solve their sawdust problem. Mr. Kayse said that West Virginia was successful in attracting a new Bruce hardwood flooring plant because they were able to provide outlets for the 600,000 tons of wood waste the plant would produce weekly. They helped work out a deal with Kingsford Charcoal to buy some of the waste and with a new power plant that would burn 50% of their wood residue and generate electricity to run their plant plus three other plants nearby. He also noted that in many states industrial facilities are using wood waste for energy purposes.

Representative Richardson asked about the problem of running out of wood. Mr. Armstrong said that the National Forest Service report to Congress says that growth exceeds cutting, but that the quality is not as good.

Representative Richardson asked how much sawdust was accumulated over a period of time. Mr. Wells said that from their three operations they produce approximately 80 tons per day. Representative Richardson then asked why they did not put in a dry kiln to absorb the surplus. Mr. Wells said even with a dry kiln they

would only utilize one tenth of the sawdust they produce.

Senator Rogers asked Mr. Wells what his citations were for and also what sizes the teepee burners came in. Mr. Wells said the citations were for smoke pollution. Mr. Wells said his burner was 32 feet in diameter and stood 45 feet high, which is designed to handle 40 tons of sawdust per day.

Senator Rogers asked if coal and wood could be mixed for generating electricity, and if so, is it being done anywhere. Mr. Kayse said that a feasibility study was done at Morehead State University to consider the burning of a blend of sawdust and coal. Senator Rogers asked why utilities weren't using such a blend. Mr. Wells said that they had discussed this with the Public Service Commission.

Representative Ballard asked Mr. Wells if sawdust would deteriorate if it was stockpiled. Mr. Wells said it would over a period of several years, but there is also a problem of spontaneous combustion.

Senator Brinkley asked what the effect sawdust would have on coal in reducing the sulfur content. Mr. Wells said he did not know. Mr. Frank Lassiter with the Forest Products Industry, said that it would depend on the sulfur content of the coal as to what mixture would be used.

Representative Bronger asked if utility companies had been contacted about burning sawdust with coal. Mr. George Siemens with Louisville Gas and Electric said that they had not been approached, but there would be problems converting to such a blend. The boilers would have to be altered and additional provisions would have to be made to keep the sawdust dry.

Mr. Kayse said there were some specialized markets in sawdust. He told of a chicken farm in Mayfield which is doing a survey of all sawmills. They need 36,000 tons per year of dry planter shavings, but their second alternative is sawdust. He also said that during this time of year sawdust is used to cure tobacco. He said that in Breeding, Kentucky there is a company that sterilizes sawdust for animal bedding for laboratory animals.

Senator Murphy thanked the speakers for their presentations. He then recognized Representative Walter Blevins. Representative Blevins said wood waste was a major problem, especially in this area of the state. He said he hoped the committee would work with the utilities in finding a mechanism to work out this problem. He thanked the committee for their time.

Senator Murphy then recognized Senator Woody May. Senator May said he appreciated the committee coming to Morehead. He said that eastern Kentucky's sawmill operations were probably hurting more than in any other region. He asked the committee to try to come up with a solution to help with the problem.

The next item on the agenda was a briefing on the Rowan County High School's wood-waste heating system. Senator Murphy introduced Assistant Superintendent of Rowan Billie Clayton, Schools. Ms. Clayton gave a brief overview of the system. Clayton said the superintendent and board members traveled Minnesota before the school was built to visit a wood-fired plant and decided to go with the system, which has proved to be a very efficient method of heating. They have been able to heat the high school and also the vocational school. Rowan County High School has 135,000 sq. ft. and the vocational school has 60,000 sq. ft. There is no cost for the fuel because the sawdust is provided by Mr. Wells. She said one expense they had was the purchase of a dump truck which holds about 7 tons of sawdust. They use about 750 tons per year. If they had decided to go with gas fuel it would have cost them approximately \$14,000 per year. She said they sell fuel to the vocational school, which in turn pays the Rowan County High School what they would have to pay if they were heating by gas, which would be around \$7,000. The combination of the two results in a \$21,000 per year savings. She said the only disadvantage to the sawdust burning system was the initial cost of \$357,000. It is supposed to be in operation for about 20 years. She said the system had been very economical to the school system, as well as helping Mr. Wells with his waste problem.

Representative Bronger asked how much the gas unit would have cost. Ms. Clayton said she did not have those figures, but that when the committee visited the high school the superintendent might have that figure. She said they did have a gas backup unit if needed. She also said the sawdust system had been virtually maintenance free.

Senator Murphy thanked Ms. Clayton for her presentation and said the committee would be touring the Rowan County High School the next day.

Senator Murphy then called on Linda Kubala, staff person, to go over materials in the folders. Ms. Kubala pointed out the letter to the congressional delegation regarding acid rain, and referred also to a news article in the folder saying that there would be no acid rain legislation during this Congress. Also there was a letter to Representative Ark who had asked about contaminated corn being used for the ethanol plant. She explained that the contamination was aflatoxin, which is common in the souteastern part of the United States, but this year with the drought it is being found throughout the midwestern states. She said the FDA put out new guidelines increasing the allowed level of aflatoxin in corn used for animal feed. She said she had talked with Bob Wade who operates the ethanol plant in Franklin, Ky. He said since the plant is shut down he would need approximately 2 million bushels of corn to open up again.

Senator Murphy recognized Senator May for a comment. Senator May said that the Energy Cabinet had made a grant to Morehead University for \$25,000 to experiment with the converting of a coal boiler to burn some sawdust. He said that wasn't near enough money to do what the university needed to do. He asked Dr. Grote if he would like to make a comment.

Dr. Grote said the feasibility study showed that it was not cost effective to mix coal and sawdust in their boilers because of the distribution problems. He said they were told that they needed to wait until they went through a major retrofit of the boilers or until they put new boilers in. He said that no one is more sensitive to eastern Kentucky's economic problems and need for jobs than Morehead University. He said the University was supportive of the idea, but they could not do anything with their existing boilders. He said that if the legislature provides funds, the University would be happy to work with the legislature and the Energy Cabinet. He said he wondered if there shouldn't be some research done on turning sawdust into profitable products and enterprises. He said the legislature may want to consider some appropriation for research purposes.

There being no further questions, Senator Murphy then announced the membership of the Subcommittee on Coal and Energy Programs and the Subcommittee on Water and Communications that were formed at the last meeting. Since neither of the co-chairmen were at the meeting, Senator Murphy said the subcommittee chairmen would be appointed by Senator Quinlan and Representative Richardson, and the members would receive a notification as to whom the subcommittee chairmen would be.

Next on the agenda was the time and place of the next meeting. The next meeting will be held November 22 in Louisville, unless a special session is called. The committee has been invited to Louisville to view the University of Louisville's telecommunications system.

Senator Murphy recessed the meeting until 9:00 a.m, October 25 where there would be a tour of the Rowan County High School and the J. C. Wells and Sons sawmill.

On October 25 the committee toured the Rowan County High School's wood-waste heating system with a presentation by Mr. Moore, Principal of Rowan County High School, and also toured the J. C. Wells and Sons sawmill. There being no further business, the meeting and tour adjourned at 10:30 a.m.

#### **ENERGY TASK FORCE**

## Minutes of the Fifth Meeting of the 1988-89 Interim

#### February 28, 1989

The fifth meeting of the Energy Task Force was held on February 28, at 10:00 a.m., in Room 109 of the Capitol Annex. Senator Bill Brinkley, Chairman, called the meeting to order, and the secretary called the roll.

Present were:

Members: Senator William "Bill" Brinkley, Co-Chairman; Senator Bill Quinlan and Representatives Woody Allen, Eddie Ballard, Jerry Bronger, Dick Castleman, Chester Gregory, Ronny Layman, Charles Nelson, Mark O'Brien, Ray Preston, A. G. Pritchett, Paul Richardson, Charles Siler, William Strong, and Richard Turner.

Guests: Phillip Badger, Southeastern Regional Biomass Energy Program; Dr. J. E. Jones, Dwayne Buckles, Mason and Hanger Engineering; Lyle D. Cobb, MEPAK; Darryl Armstrong, TVA; Frank Lassiter, Kentucky Forest Industries Association; and David Boswell, Governor's Office; Barry Mayfield, East Ky. Power Cooperative, Inc.; Sherron Jackson, Council on Higher Education; Margaret Grissom, Economic Development Cabinet; John Stapleton, Energy Cabinet; John Barnett, South Central Bell; Peggy Jackson, Ky. Association for Community Action.

LRC Staff: .Linda Kubala, Mary Lynn Collins, John Hurter, and Diana Lynn Hill

Press: KET.

Senator Brinkley called for the approval of the minutes of the November 22 meeting. The minutes were approved without objection.

First on the agenda was Mr. Phillip Badger, Manager of the Southeastern Regional Biomass Energy Program. Mr. Badger began his presentation by noting that wood waste is a problem throughout the Southeast. To illustrate the extent of the problem he provided data on the amount of unused residues in the Tennessee Valley Authority (TVA) region. Sawmills produce more wood residue than any other forest product industry. In 1984 sawmills in the TVA region were unable to find markets for 600,000 tons (53%) of the wood waste produced. The miscellaneous wood product group had 16% of the wood residue it produced unutilized. On the other hand the pulp and paper industry, the second largest producing group of wood residues, was able to utilize almost all of its waste.

Mr. Badger discussed the economics of using various fuels and the three main energy products wood waste can produce: hot air, steam, and electricity. While steam or hotwater is the energy form being produced most often, the production of electricity from wood is currently attracting the most interest. A 36 megawatt power plant in the Burkesville area is currently being considered by private investors. The facility would use sawdust to produce the electricity. With a proposed \$1 million annual payroll, this facility would provide jobs for the community as well as solve a waste disposal problem for area sawmills.

Mr. Badger then discussed renewed interest in co-firing of wood and coal. With co-firing there is increased efficiency and a reduction of sulfur. Since coal burns with a lower flame than wood much of the coal's sulfur is consumed in the wood flame. Claims are made that by burning a 50/50 coal and wood mixture based on BTU value, sulfur emissions can be reduced by 90%. Mr. Badger cautioned that more research needs to be done to document such claims but that the technology does hold promise. He cited a number of co-firing systems currently in place such as the heating system at the University of Missouri at Rolla and an industrial park in Martinsville, Virginia.

The use of sawdust to produce compressed wood products such as logs and pellets is also increasing. The state of West Virginia has just completed a market study on compressed fuel logs. Based on new technologies available to produce the logs and access to urban fuel markets in the East, the state plans to develop a compressed fuel log industry.

The potential increased market for wood pellets was also discussed. There is already on the market stoves to burn wood pellets. These stoves meet the new EPA guidelines, and are convenient with automatic feeders and thermostatic controls. Production of wood pellets has been slow, however, because: (1) capital costs for pellet manufacturing are high; (2) the process is energy-intensive; and (3) maintenance costs of pellet-producing machinery are high because of the abrasiveness of the wood materials. If these costs can be lowered, wood pellet manufacturing could be an important economic development tool for rural communities. Mr. Badger explained that he was planning to visit some states in the western part of the county to investigate new technologies coming out for pellet manufacturing.

While not economical at this point, Mr. Badger noted that the production of fuel alcohol from wood could, in the future, be an important market for wood waste. TVA has for several years operated a pilot fuel alcohol facility in Alabama that uses two tons of wood waste daily.

Mr. Badger then called to the committee's attention the various handouts and publications he had brought, including a summary of projects funded by the Southeastern Biomass Energy Program and a listing of other possible funding resources for wood-related projects. He observed that several states in the Southeast region had chosen to use oil overcharge monies received as the result of court settlements for price violations of petroleum products to fund wood energy demonstration projects. He concluded his remarks by

summarizing the potential economic benefits to developing energy markets for wood waste.

In response to questions from Representative Allen concerning waste products and acid rain, Mr. Badger said that wood waste included veneer furniture operations and anything associated with the forest products industry. There would be no acid rain problems burning wood due to the fact that there is no sulfur in the wood.

Representative Pritchett asked if there was any future for the wood and coal burning combination. Mr. Badger said there was potential promise if research is done to verify the claims that sulfur emissions can be reduced significantly by the co-firing in the right proportions depending on the sulfur content and other variables. Representative Pritchett then asked if the Tennessee Valley Authority had looked into this process. Mr. Badger said that the TVA had looked into this during the oil crisis of 1972-1973 and had concluded that it was not feasible because of the boiler capacities and the density of wood residue. He did say that there were new people within the organization who were going to pursue the issue. The U. S. Department of Energy has appropriated \$350,000,000 for sulfur removal technology.

In response to a question by Representative Bronger concerning why utilities who don't use scrubbers haven't been made to use wood, Mr. Badger responded by saying that he really didn't know what the situation in Kentucky was. It really depends on the kind of coal used and the emission regulations. Mr. Badger has not talked to any utilities in Kentucky, with the exception of TVA.

Representative Richardson asked if the cost would rise if the sawdust had to be hauled any distance. Mr. Badger said a truck-trailer van hauling 23 tons at \$1.50 a loaded mile would come to about  $7\rlap/e$  per ton per mile, and that the effective hauling radius would be around 50 miles.

Representative Allen asked if some mills were using all of the waste. Mr. Badger said there are markets for pressboard, but it was very limited in Kentucky.

Representative Gregory asked about the cost effectiveness of co-firing compared with scrubbers. Mr. Badger called on Mr. David Stephenson, who has worked with the air emissions program at TVA. Mr. Stephenson said in order to reduce emissions utilities would have the choice of scrubbers, switching to low sulfur coal, coal blending, or co-firing. He said the front-end cost for the wood-feed system is less costly than wet scrubbers if you have 4% sulfur coal. He has worked with the TVA on the Shawnee plant and the cost of dry scrubbing is 75% that of wet scrubbing, but there would still be the problem of disposing of material. He also pointed out to the committee that wood waste can be burned in conjunction with solid waste for energy production and encouraged the committee to pursue this alternative.

Representative Nelson asked what happened to the sulfur in the coal when it is mixed. Mr. Badger said as far as he could tell the sulfur is tied up in the ash much like a fluidized bed combustion system.

In the absence of Senator Brinkley who had to leave for another appointment, Representative Bronger called on Dr. J. E. Jones, Vice President of Marketing for Mason and Hanger Engineering Inc. Dr. briefed the committee on the study, carried out for the Department of Facilities Management of the Finance Cabinet, to look at the feasibility of converting existing boilers at Morehead State University to burn a wood-waste and coal blend. The project was carried out in 1987 with funds through the Kentucky Energy Cabinet and the Southeastern Regional Biomass Energy Program. The four major (1) energy consumption patterns at the looked at were: wood waste; (3) technical availability of (2) university; considerations in determining modifications to be made; and (4) the economics and recommendations. They looked at the Rowan County High School system which burns sawdust and also went to the Kimball piano plant, which burns a wood and coal blend, in Indiana. He then turned the presentation over to Mr. Dwayne Buckles, who was the project engineer.

Mr. Buckles presented three scenarios in looking at the boiler conversion. First was to convert boilers to burn 100% sawdust and another was to burn a 50/50 mixture of sawdust and coal. The other scenario was to actually remove one boiler and put in a 100% wood burning boiler. The study was narrowed down to the conversion to 100% sawdust and the 50/50 mixture. He discussed the sawdust supply in the Morehead area and said that there were about eight sawdust mills producing 38,000 tons per year of sawdust within a five-mile radius of the university. They looked at several different ways of hauling the sawdust and decided the sawmills could share in the cost of trucking. He also touched on the problems of storage but said they decided on the 50/50 conversion of existing boilers after considering storage facilities, uninterrupted supply of sawdust and the high cost of alternate fuels.

In response to questions from Representative Bronger concerning storage and costs, Dr. Jones said that with the quantities to be used several very large silos would be needed. They had looked at nine options with a cost ranging from \$822,000 to \$1.5 million.

Representative Turner mentioned that the cities of Nashville, Tennessee and Simpson, Kentucky produce energy by burning garbage. He asked if the possibility of burning garbage as a backup to sawdust had been considered at Morehead. Mr. Stephenson said he was not aware of the situation in Morehead but felt there would be some problems associated with the handling process.

Representative Bronger thanked Mr. Badger, Dr. Jones and Mr. Stephenson for their presentations. He then mentioned that Linda Kubala, staff person, would be sending a memo concerning the two recently formed subcommittees. Anyone interested in being on a

subcommittee or making a change should let staff know before the next meeting. The next meeting was scheduled for March 28.

There being no further business, the meeting adjourned at 11:30.

#### TASK FORCE ON ENERGY

## Minutes of the Eighth Meeting of the 1988-89 Interim

#### May 23, 1989

The eighth meeting of the Task Force on Energy was held on Tuesday, May 23, 1989, in Room 109 of the Capitol Annex. Representative Bobby Richardson, Chairman, called the meeting to order, and the secretary called the roll.

#### Present were:

Members: Senator Bill Quinlan, Co-Chairman; Representative Bobby Richardson, Co-Chairman; Representatives Woody Allen, Eddie Ballard, Jerry Bronger, Dick Castleman, Bud Gregory, Ronny Layman, Bill McBee, Charles Nelson, Mark O'Brien, Ray Preston, A. G. Pritchett, Paul Richardson, Charles Siler, William Strong, and Richard Turner.

Guests: Jeff Noel and Margaret Grissom, Economic Development Cabinet; Frank Lassiter, Kentucky Forest Industries Association; Dan Yates, Kentucky Association of Electric Cooperatives; Gary Crawford, East Kentucky Power; John Barnett, South Central Bell; Brad Perkins, Big Rivers; Ray Jones, MCI Communications; Randy Byrd, Kentucky Power; and David Boswell, Governor's Office; .

LRC Staff: Linda Kubala, Mary Lynn Collins, Bob Rowland, Karen
Thomas, John Hurter, and Diana Lynn Hill.

Representative Richardson called for the approval of the minutes of the last meeting. The minutes were approved without objection.

on findings First on the agenda was а report Environmental Regulations and Wood Waste Committee of the Governor's Task Force on the Forest Products Industry, by Mr. Jeff Noel, Executive Director, Management and Operations in the Economic Development Cabinet. Mr. Noel introduced Mr. Frank Lassiter with the Kentucky Forest Industries Association and Ms. Margaret Grissom with the Cabinet for Economic Development, who is in charge of overseeing the activities of the Forest Products Industry Task Force, as well as developing projects dealing with the wood industry. Mr. Noel distributed and the preliminary went over report Environmental Regulations and Wood Waste Committee of the Task The entire Forest Products Industry Task Force will be reviewing all of the committee reports and use them to prepare final recommendations.

Mr. Noel said the committee met because of environmental concerns about regulations which have halted open burning and loosely controlled incineration. Regulations relating to wood waste fall into three categories: (1) air quality regulations; (2) water

quality regulations; and (3) solid waste regulations. The Committee found that state regulations regarding wood waste or those relating to wood waste, are promulgated with the guidance of federal law. Because it is important that legislative intent be followed, it is suggested that the Cabinet for Natural Resources conduct a comparative analysis of wood waste related regulations to those of neighboring states to see if they are consistent.

Much of Kentucky's wood waste disposal problem is due to the geographic location of users, such as the paper industry. Both of Kentucky's paper mills are located on the Ohio River in the western end of the state, which means the eastern users must ship products long distances to these users or to a neighboring state.

request of the Environmental at the Noel said that Regulations and Wood Waste Committee, the Kentucky Division of Forestry has completed a survey to assist in identifying problem regions where large quantities of mill residue are not being used. Mr. Noel then pointed out tables summarizing the total mill residue produced and utilized by U.S. Congressional District, and county breakdowns of the Fifth and Seventh Congressional Districts. These two districts are having the most difficult time of disposing of residue. He pointed out that other states have a better distribution of users, and some states have passed legislation alloting tax credits for using wood residue for fuel. The New England states utilize the bulk of their residue to co-generate electricity, which is expensive in those states.

In summary it appears that wood waste is a viable alternative to other types of fuel. There are also environmental implications that might make it preferable to use in some instances. Evidence is growing to support using wood residue as a supplement to high sulfur to reduce sulphur emissions. Alternative uses other than burning include using wood residue as an agent in municipal sewage sludge to make compost that can safely be used as a soil amendment. Mr. Noel said the committee made broad recommendations to the Forest Products Industry Task Force. One is that a pilot project mixing wood residue with high sulphur coal to reduce sulphur emissions should be looked at in Kentucky. Second, they recommended that consideration be given to a cost analysis of wood and other conventional energy systems in the planning and construction of public facilities. They are also recommending to the Task Force that tax credits be enacted and then phased out over a period of 10 years for capital investments of wood or coal energy systems with emphasis on wood and coal mixtures. Other recommendations are that a low interest loan program for wood energy systems be put in place and that the Economic Development Cabinet agressively pursue a residue user for the Eastern Kentucky area to provide a market for residue producers in that area. These recommendations will be studied and put in a formal form to be reviewed by the Economic Development and the Forest Products Industry Task Force. consideration would be several financing alternatives that need to be looked at. Mr. Noel said that until a way is found to utilize all wood residue, the wood industry will not be able to expand.

Mr. Frank Lassiter said he appreciated the patience of the Energy Task Force with the Forest Industries Association. He said they now have a target area in the state where the biggest problems occur and some alternatives. He thanked the Energy Task Force for their consideration of the problem.

Representative Allen asked if the two papermills in Kentucky used sawdust and chips. Mr. Lassiter said that chips are used for production of paper and sawdust is used for energy to heat the vats in order to make the pulp. Representative Allen asked if there was any way to burn sawdust mixed with high sulphur coal. Mr. Lassiter said there was evidence that sulphur emissions would be lowered, but the verdict is still out and more research needs to be done.

Representative Pritchett asked if any studies had been done in other parts of the country. Mr. Lassiter said that most of the other states are more fortunate than Kentucky because of better distribution of users. The problem could be alleviated if there was a user in the northeastern part of the state.

Representative Bobby Richardson asked what the relative energy values were of a ton of sawdust versus a ton of coal. Mr. Lassiter said heating per pound is 4,500 btus for sawdust with a 65% moisture content, and around 13,000 for high grade coal. Representative Richardson asked if there was a process where sawdust could be pelleted and shipped easier than it is now. Mr. Lassiter said there is a company looking at Kentucky now to put in a pellet processing facility. Regarding this project, Ms. Grissom said that pellets for residential use need to have a particular stove rather than just any woodburning stove. There are possibilities being looked at now for using pellets in schools or hospitals.

In response to another question from Representative Richardson concerning pollutants, Mr. Lassiter said the biggest concern with burning wood is the ash that escapes. Less ash escapes with higher burning temperatures.

Representative Nelson asked if stockpiling has an environmental effect. Mr. Lassiter said oak wood contains tanic acid that can get into streams and waterways. Representative Nelson said Kentucky should induce someone to go into the paper business. Ms. Grissom said a preliminary recruitment effort is underway for a pulp and papermill, but projected costs are between \$400 and \$800 million.

Representative Bobby Richardson asked if Kentucky grows more board feet of lumber every year than they harvest. Mr. Lassiter said that Kentucky was cutting about four percent and growing about five percent on an annual basis.

In response to a question from Representative Paul Richardson regarding sawmills, Mr. Lassiter said sawmills were licensed and could landfill up to two acres if they have no environmental problems. If an environmental problem exists and they are sited, then they are required to close it or clean it up. Ms. Grissom said there were sawmills in Kentucky that cannot expand and employment is

being held at current levels because they cannot dispose of the sawdust properly. Representative Paul Richardson then asked if consideration had been given to developing an incentive package, partially funded by the sawmills, to bring in a larger wood waste user like a papermill. Mr. Noel said that this could be considered and Mr. Lassiter responded that there were some in the industry that would be willing to participate.

Next on the agenda was a presentation of the Energy Task Force Draft Report on Wood Waste Utilization by Mary Lynn Collins, staff person. Ms. Collins said the report was a summary of what the Task Force has done with regard to the issue of wood waste as directed by HR 163. Ms. Collins briefly went over the report and then pointed out possible recommendations for the Task Force's consideration.

Representative Richardson suggested that members review the recommendations before the next meeting, and possibly staff and other agencies involved could discuss the recommendations in more detail at a future meeting.

Representative Richardson pointed out Senator Murphy's letter summarizing the meeting with the Southern Legislative Conference Energy Committee regarding the acid rain report. Senator Murphy's letter indicated the Energy Committee was supportive of the Task Force's resolution regarding acid rain.

Representative Castleman gave a report on what the Subcomittee on Water and Communications had done at their first meeting. The Subcommittee reviewed the issue of small rural water systems, hearing from both the Chairman of the Public Service Commission, Mr. George Overbey, Jr., and Mr. Gary Larimore, Executive Director of the Kentucky Rural Water Association. It was agreed that enforcement of new regulations under the 1986 Safe Drinking Act will mean higher consumer prices for water. Possible mergers of water districts and associations were discussed, along with the leak detection program.

There being no further business, the meeting was adjourned at 2:00 p.m.

#### Appendix C

## Interviews with Officials in Other States for Survey Discussed in Chapter III

#### ARKANSAS:

Randall Leister Director, Technical Services Arkansas Forestry Commission January 19, 1989

#### **GEORGIA:**

Tommy Loggins Research Section Georgia Forestry Commission January 31, 1989

#### IDAHO:

Robert L. Govett, Professor College of Forestry University of Idaho February 23, 1989

Gerry Galinato Energy Resource Supervisor Idaho Department of Water Resources and Energy February 23, 1989

#### ILLINOIS:

John Sester Staff Forester Division of Forest Resources Illinois Department of Conservation December 15, 1988

#### INDIANA:

Bob Mayer Forest Products Utilization Specialist Division of Forestry Indiana Department of Natural Resources December 15. 1988

#### MICHIGAN:

Robin Bertsch Forest Development Division Section Chief Forest Management Division Michigan Department for Natural Resources January 19, 1989

#### MINNESOTA:

Richard Dahlman Utilization and Marketing Specialist Division of Forestry Minnesota Department of Natural Resources February 2, 1989

#### MISSOURI:

Shelby Jones
Forest Products Utilization Specialist
Forestry Division
Missouri Department of Conservation
January 4, 1989

Richard Landers Executive Director Forest Products Association March 29, 1989

#### NORTH CAROLINA:

Whit Stallings Industrial Forester North Carolina Forest Service January 31, 1989

#### OHIO:

Mike Long Utilization and Management Forester Division of Forestry Ohio Department of Natural Resources December 15, 1989

#### PENNSYLVANIA:

Paul Szabara Wood Energy Forester Pennsylvania Department of Environmental Resources February 2, 1989

#### TENNESSEE:

Robert Wright Utilization Forester Tennessee Department of Conservation Division of Forestry January 19, 1989

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